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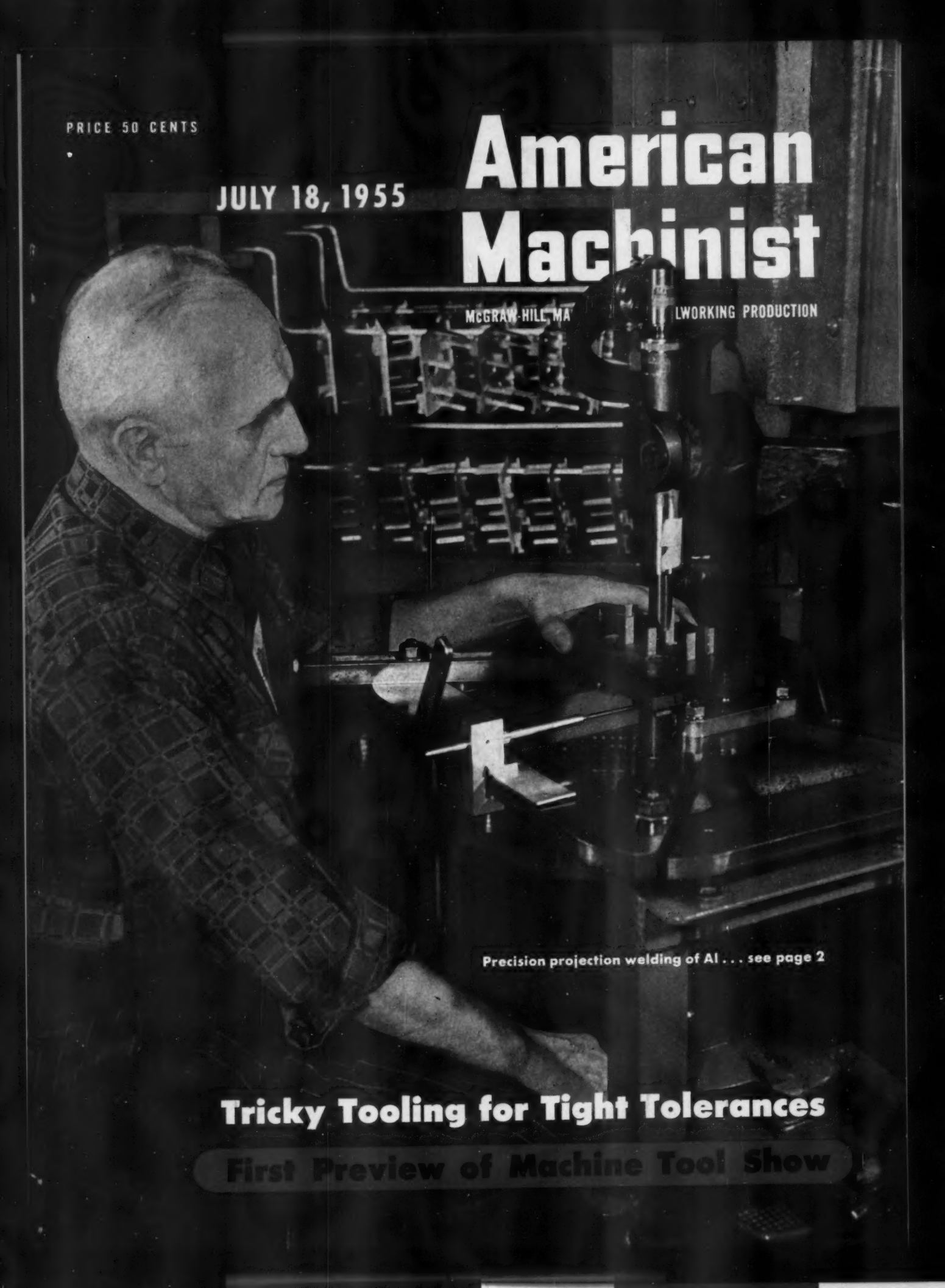
JULY 18, 1955

American Machinist

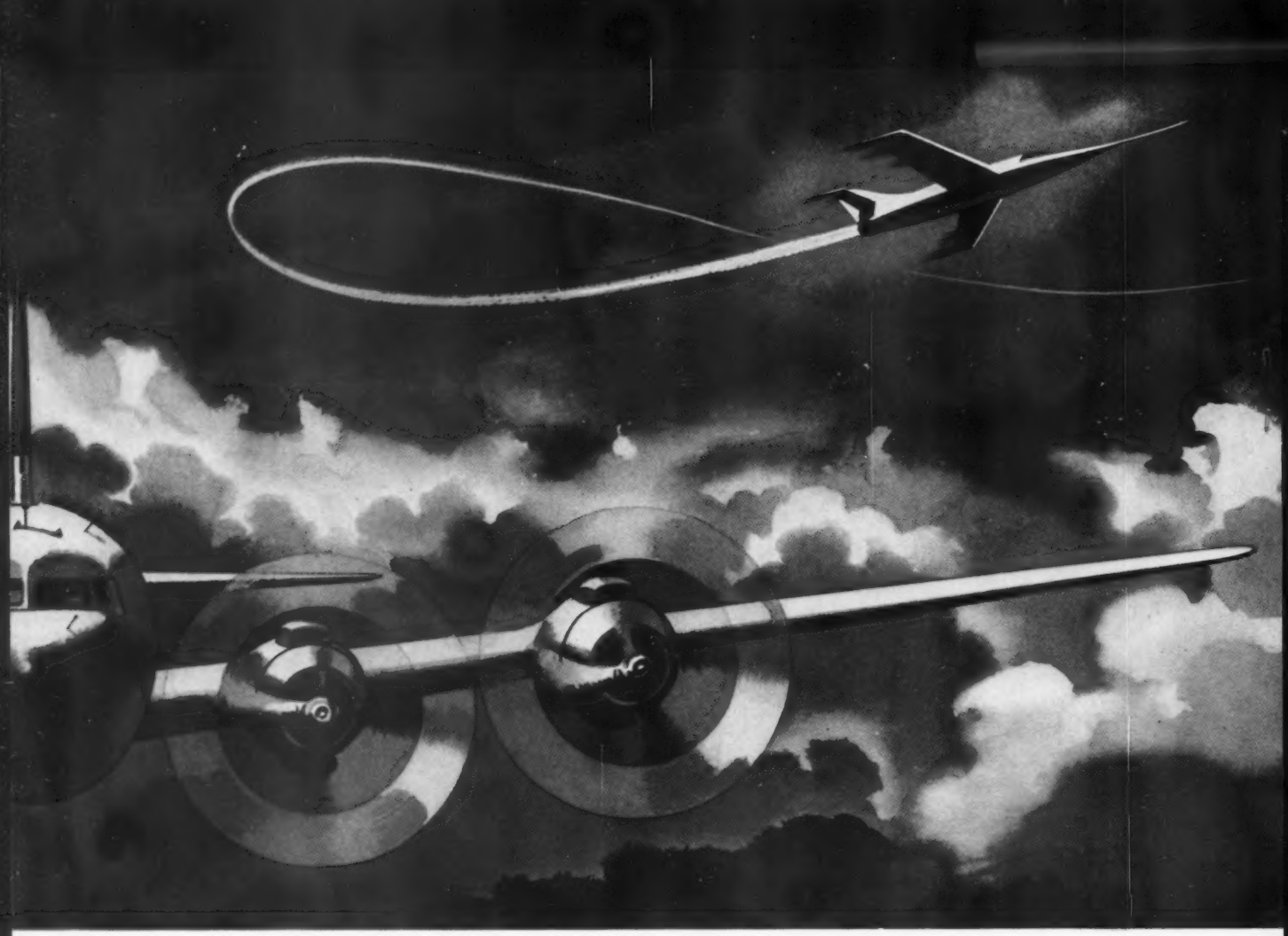
McGRAW-HILL, MA LWORKING PRODUCTION



Precision projection welding of Al . . . see page 2

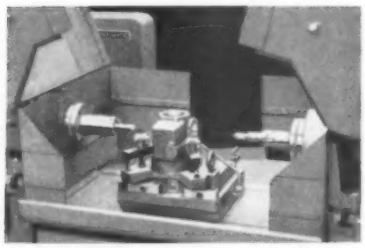
Tricky Tooling for Tight Tolerances

First Preview of Machine Tool Show



the finest precision parts

are finished on Heald machines



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ON ONE
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The Model 322 Bore-Matic shown above borizes critical surfaces on five entirely different jet engine components — each with a different fixture and tooling setup. Easily interchangeable fixtures and boring tools enable this one machine to perform a variety of semi-finishing and finishing operations on the different parts — with minimum down-time for changeovers.

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Whether the job calls for long runs or frequent changeovers, you'll get maximum precision plus maximum production on a Heald. Moreover the aircraft industry is just one of many where new Heald equipment is paying off *right now* in terms of lower costs, larger profits and better product. May we serve you, too?

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American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc. James H McGraw (1860-1948), Founder. EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Donald C McGraw, President; Paul Montgomery, Executive Vice President; Joseph A Gerardi, Vice President and Treasurer; John J Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Joseph H Allen, Vice President, Director of Advertising; J E Blackburn Jr, Vice President and Circulation Director.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, N Y. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates — United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Reentered as second-class matter, November 17, 1953, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

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NUMBER OF COPIES PRINTED THIS ISSUE 38,704

chips

PRECISION PROJECTION . . . Our cover photo, taken at Ford Instrument Co, Long Island City, NY, shows a Taylor-Winfield spot-welder making a precision weld on aluminum. Welder has a special anti-friction welding head with preloaded roller bearings and rolling-diaphragm air lock. These features, coupled with special tooling, make it possible to repeat within 0.002 in. Further details are in a picture-caption story in this issue. Process steps and problem-solving are all there.

CHICAGO . . . Our lead article, compiled by Executive Editor Tangerman from many visits to builders and industry contacts, gives the first preview of what will be at three Chicago shows, principally the Machine Tool Show itself. This article deals with the principles and the ideas to be exhibited; actual machines have been and will be described in our pages—the grand finale being our Chicago Show Issue of Aug 29. That will be your guide to all three shows. And watch our "New Equipment Materials & Parts" section in every issue. It is loaded with the first descriptions of the machines you'll see at Chicago.

AUTOMATIC METER . . . For at least three years, we've been trying to get a story on the Somersworth, NH, plant of General Electric, where watt-hour meters are made. Rumor had it that it incorporated dozens of new ideas. Our current Special Report tells the story at last, with the aid of GE's John Woodman and H F Simon. Both these men are constant *AM* readers, thus having discriminating eyes for what we have not previously described. Here are 16 pages of ideas—including a realistic approach to apprenticeship.

PRINTED LAYOUTS . . . There is a cheap, quick, and effective method for printing machining layouts on plastic or metal. No elaborate equipment is needed, and a single photo negative can be used repeatedly. Here is a useful idea for small-lot production, presented by the four developers at Diamond Fuze Labs, Washington, DC.

TOOLING . . . Stuart Wadsworth, of Haskell Electronics, explains how a hollow mill is cammed on the end of a progressive die. It comes in to mill a spherical shape on the end of the part. . . . There is also a short on automatic forging of small crankshafts, and some data on forming and welding zirconium sheet.

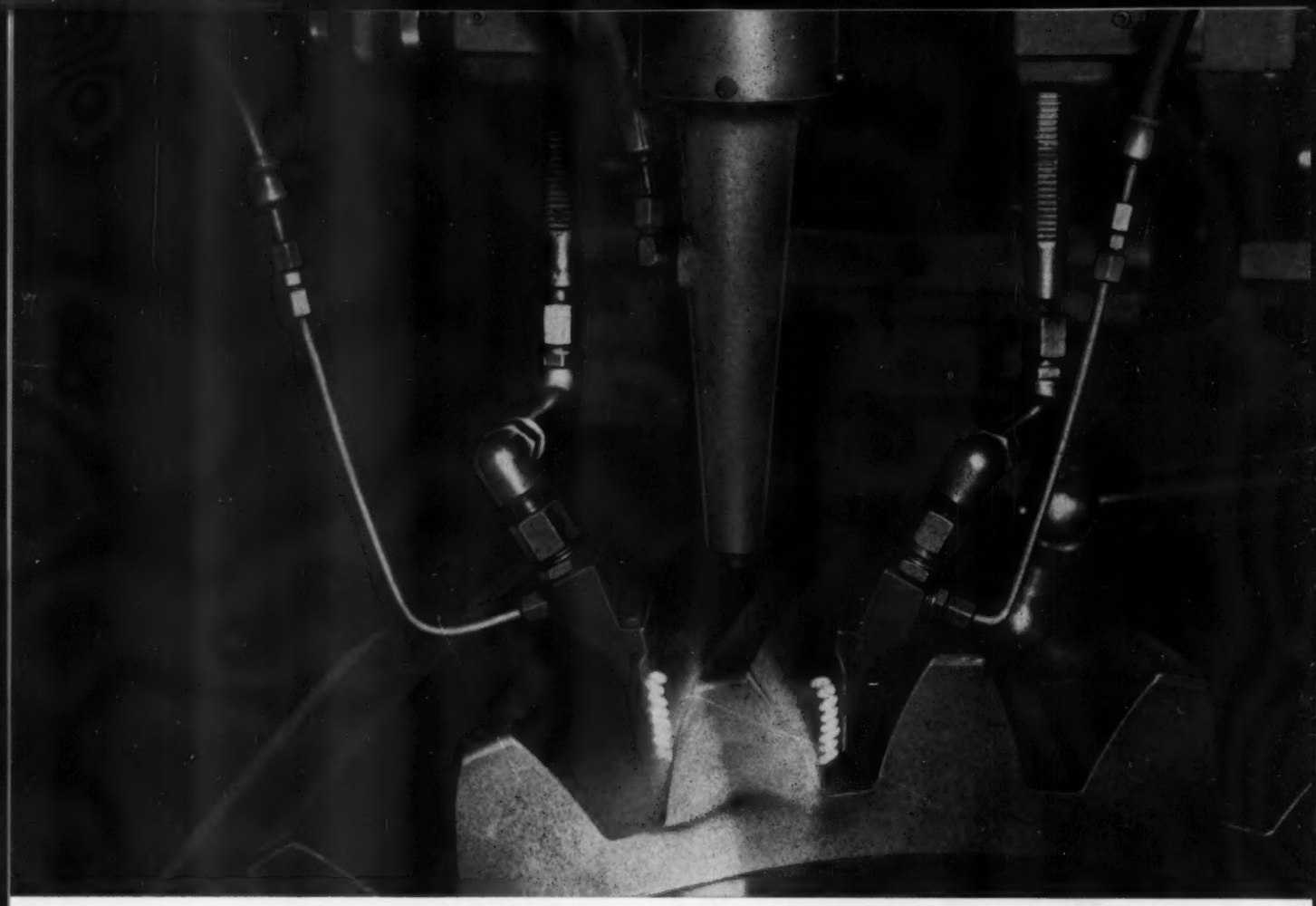
FITTING SPLINES . . . S J Johnson, chief engineer of the Small Tool Div, Barber-Colman, tells how to achieve desired fits in parallel-key splines. Here is a follow-up to his story on involute splines in *AM* July 4. Formulas and other time-saving data are included.

COMING . . . *AM* for Aug 1 will be quite unusual for the dog days. Articles are short and designed to alert you. The Special Report describes a trail-blazing automated line. There's an insert on production soldering, a startling AEC story that ties in with the cover, something on a new process called uniskanning, and a new roundup on numerical control.

JOHN A WOODMAN

H F SIMON Jr

QUALITY TEAM . . . John A Woodman is a G E man through and through, graduating as a tool and diemaker apprentice at Lynn River in 1939, becoming methods leader at Everett Supercharger plant in '40, asst supt of screw machines and headers at West Lynn in '44, and since '47 mgr of Mfg Engrg at Somersworth, N H. He is a member of the ASTE, past member of several committees, studied ME and EE at Lowell Institute School . . . H F Simon, Jr, is an ME from Northeastern, has been at Somersworth since 1950, as methods man, mfg foreman in assembly ('52), supervisor, Contributing Methods and Planning Sub-Unit ('52) and unit supervisor, Methods and Planning ('54). Both men are married, each has three children. They collaborate on our current Special Report.



It uniformly controls
surface hardening of gear teeth

You can step up the wear resistance of gear teeth greatly with Gleason Surface Hardeners. They provide localized hardening *without distortion* because of uniform temperature control.

Key to this performance is the radiation pyrometer and electronic controls. That vertical gun-like barrel in the center of the photo above is the radiation pyrometer. It is focusing directly on the tooth being hardened. As the oxyacetylene burners heat the tooth, the thermopile receives radiant energy from the heated metal. An electronic balancing device converts that energy to control forces which govern the travel of the burners along the tooth.

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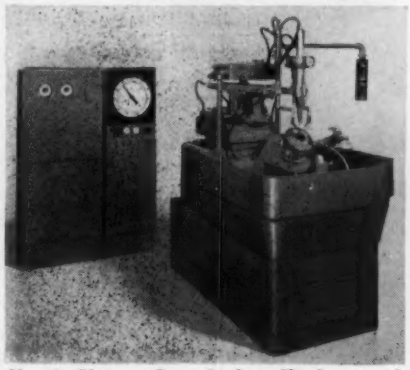
Gleason Surface Hardeners assure absolute uniformity of all teeth on a gear and every gear in a lot. They are adaptable to hardening straight bevel, spiral bevel, Zerol, spur, herringbone and helical gears. For additional information, write for the booklet "The Surface Hardening of Gear Teeth."



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. . . is worth a "pound of cure" for undersize parts

MACHINE TOOL SHOW
INTERNATIONAL AMPHITHEATRE
CHICAGO, ILL.
SEPT. 6-17, 1955

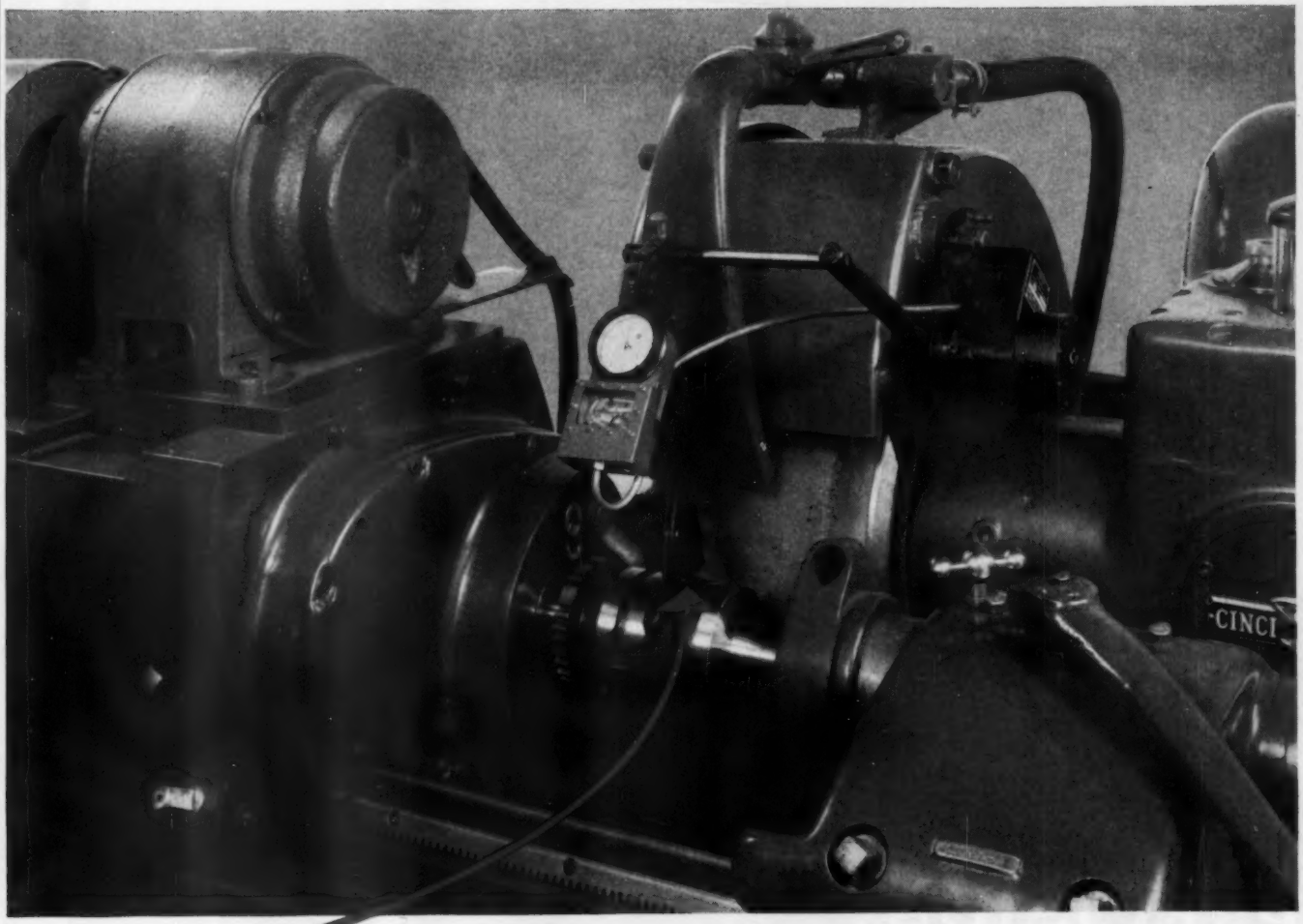
BOOTH 1205

CINCINNATI FILMATIC 10" x 18" Plain Hydraulic Grinding Machine equipped with Automatic Electric Gage Sizing, with its exclusive Automatic Compensation feature. Complete information in two publications: G-603 and G-638. Write for your copies.

You can do something about parts that are ground oversize. But when they're undersize, someone's in the doghouse, and expensive parts may have to be salvaged or thrown in the scrap bin. You can now do something about this uncontrolled item of expense. The cure is simple . . . equip your shop with CINCINNATI FILMATIC Plain Hydraulic Grinders having Automatic Electric Gage Sizing. You then gain the dual advantage of uniformly close accuracy and uniform rates of production. Manual adjustments are eliminated. ¶The light, sensitive touch of the contact fingers that signal exact sizing to the wheelhead retraction mechanism assure consistent dimensional quality. The length of cycle and cycle time are exactly the same for the entire lot of parts, regardless of wheel wear, assuring uniform rate of production.

CINCINNATI

CINCIN



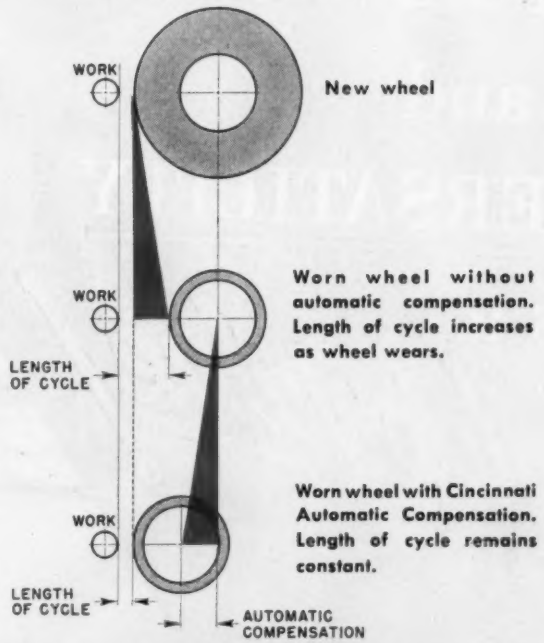
Close-up of Automatic Electric Gage Sizing equipment on CINCINNATI FILMATIC 10" Plain Hydraulic Grinding Machine.

The feature responsible for the latter advantage, known as "Automatic Compensation," is diagramed at the right. ¶You can now have Cincinnati Automatic Electric Gage Sizing, with its exclusive Automatic Compensation feature, on any new CINCINNATI FILMATIC 6", 10"-L, 10", 14"-L Plain Hydraulic Grinder. In conjunction with other outstanding Cincinnati advantages such as FILMATIC grinding wheel spindle bearings and automatic wheel balancing, Cincinnati offers top value for your precision grinding operations. Our field engineers and sales representatives want to tell you more about these Cincinnati features and how they will reduce costs in your shop.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

AUTOMATIC COMPENSATION

an exclusive feature of Cincinnati Automatic Electric Gage Sizing.


WORK
New wheel
WORK
Worn wheel without automatic compensation. Length of cycle increases as wheel wears.
LENGTH OF CYCLE
WORK
Worn wheel with Cincinnati Automatic Compensation. Length of cycle remains constant.
LENGTH OF CYCLE
AUTOMATIC COMPENSATION

FILMATIC

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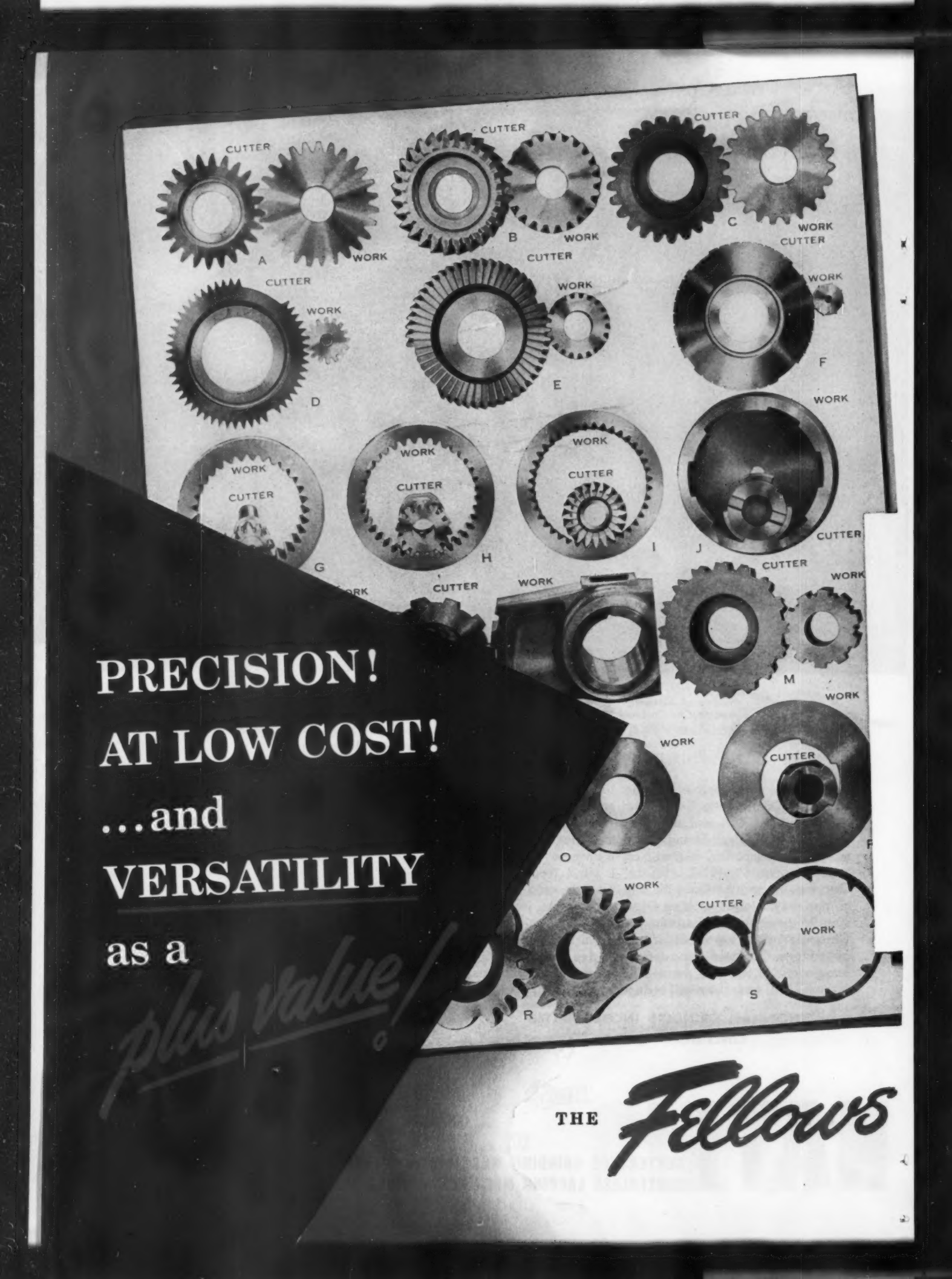
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES



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AT LOW COST!
...and VERSATILITY
as a *plus value!*

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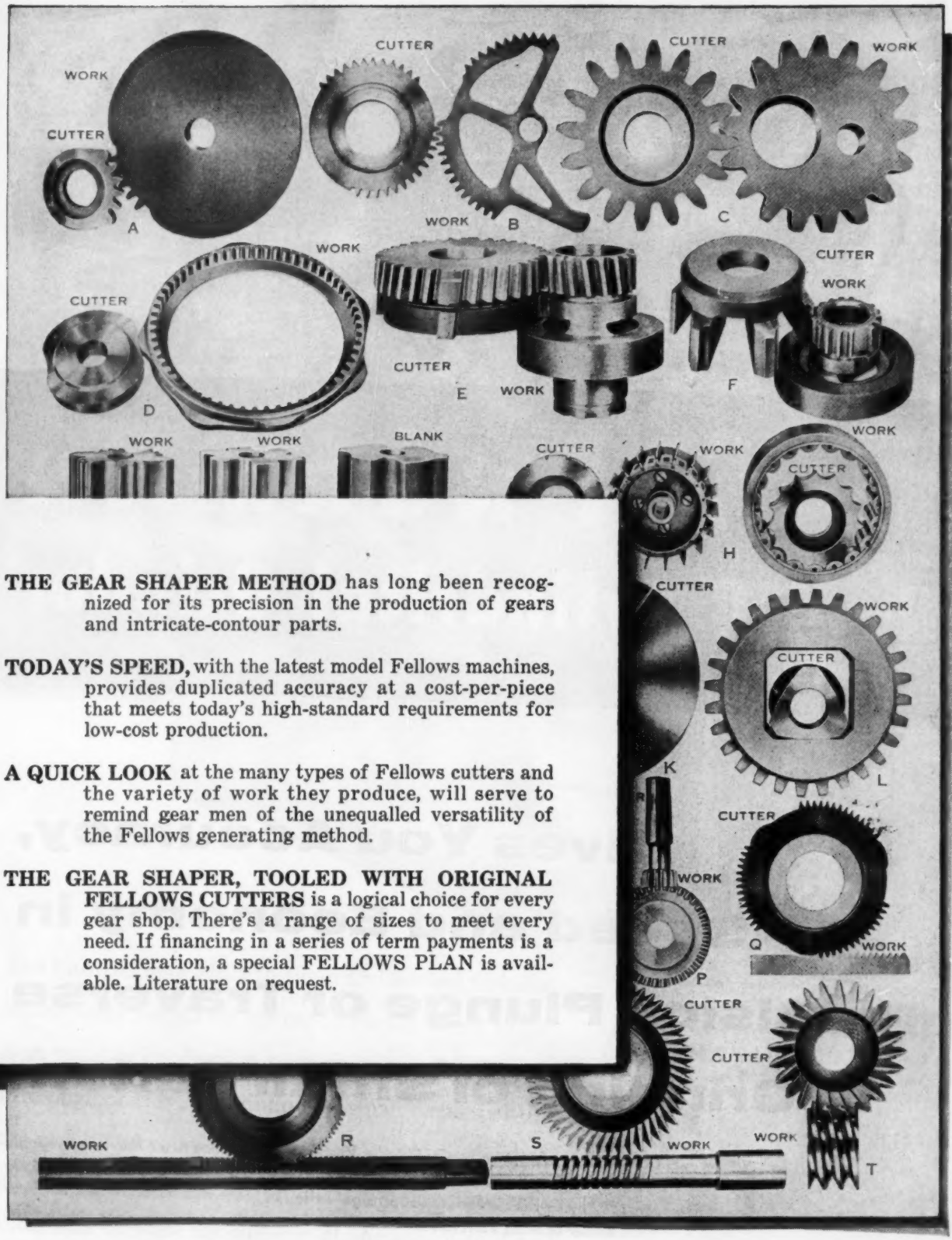

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No. 418 Cylindrical Grinder

Gives You Accuracy, Speed and Economy in Precision Plunge or Traverse Grinding of Small Parts...

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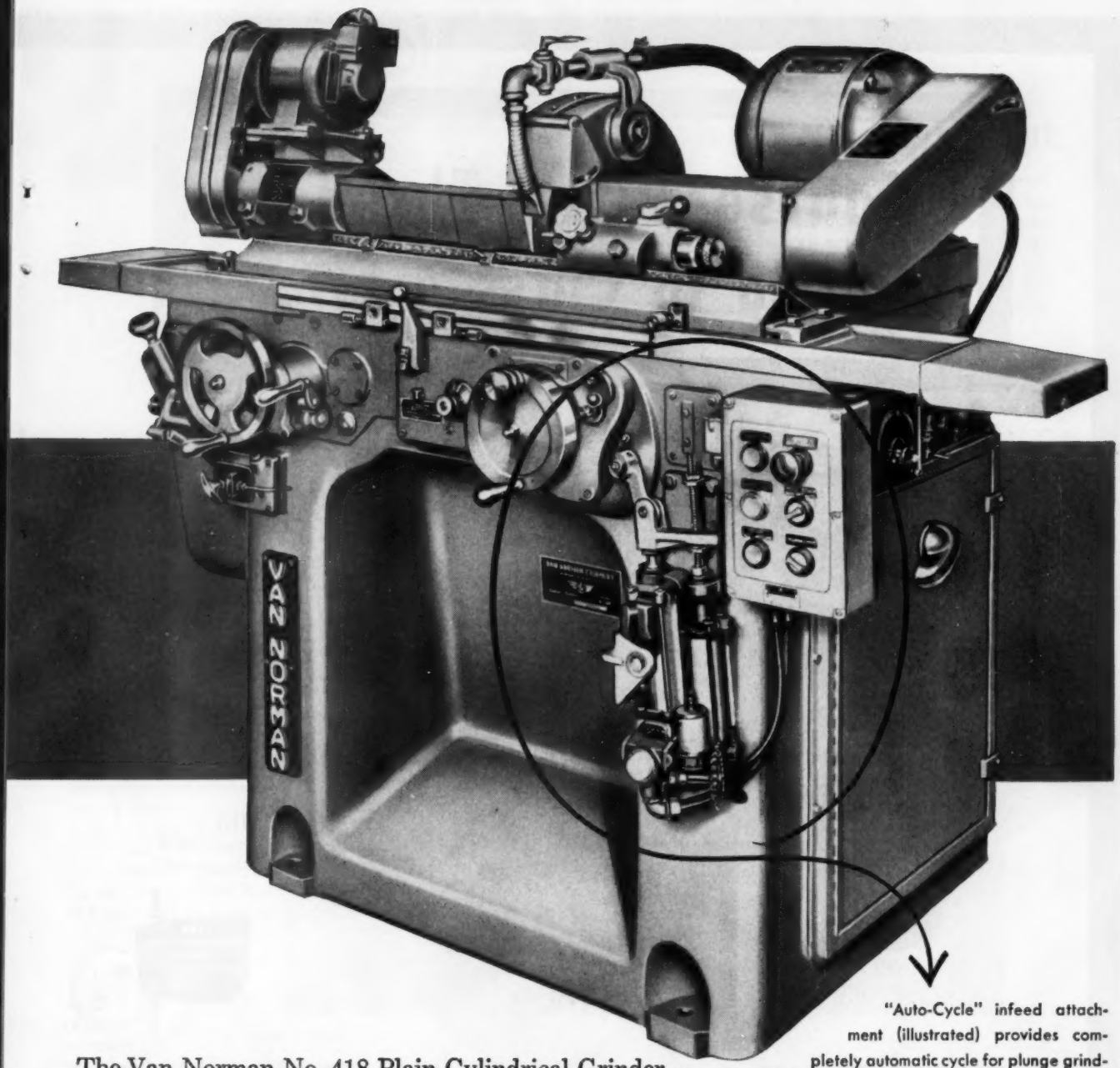
MANUFACTURERS of—Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.



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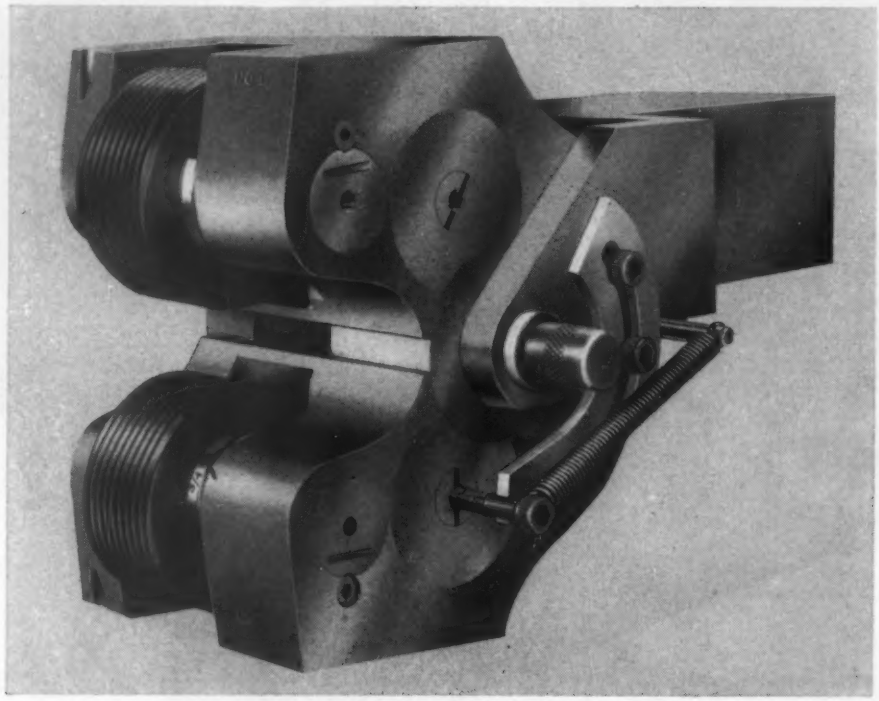

This equipment displayed at:

THE MACHINE TOOL SHOW BOOTH 1406

The LANROLL Thread Rolling Attachments offer features designed to ensure greater accuracy, flexibility and economy when producing threads. . . .

1. *PERFECT HELIX AGREEMENT* allows rolling coarse pitch threads to Class 4 tolerances with long roll life. Threads can also be rolled directly to a shoulder with safety.
2. *ADJUSTABLE DESIGN* provides wide range coverage for each attachment size without loss of rigidity.
3. *SUITABLE SIZES* of LANROLL Attachments have been designed for all types and sizes of automatic screw machines and turret lathes with power feed.
4. *RAPID AND PRECISE SET-UPS* are possible with special gaging methods designed for easy use and the elimination of "cut-and-try" set-ups.
5. Five sizes of Attachments roll a wide range of threads:
   #14—#5 to ⅜"; #18—#5 to ½"; #20—⅜" to 1"
   #22—⅝" to 1¼"; #24—¾" to 1¾"

Other outstanding advantages of these LANROLL Attachments include: behind-the-shoulder threading; taper correction; and excellent thread finish and microstructure. For additional information ask for Bulletin G-96—please send specifications when writing.

LANDIS *Machine* COMPANY

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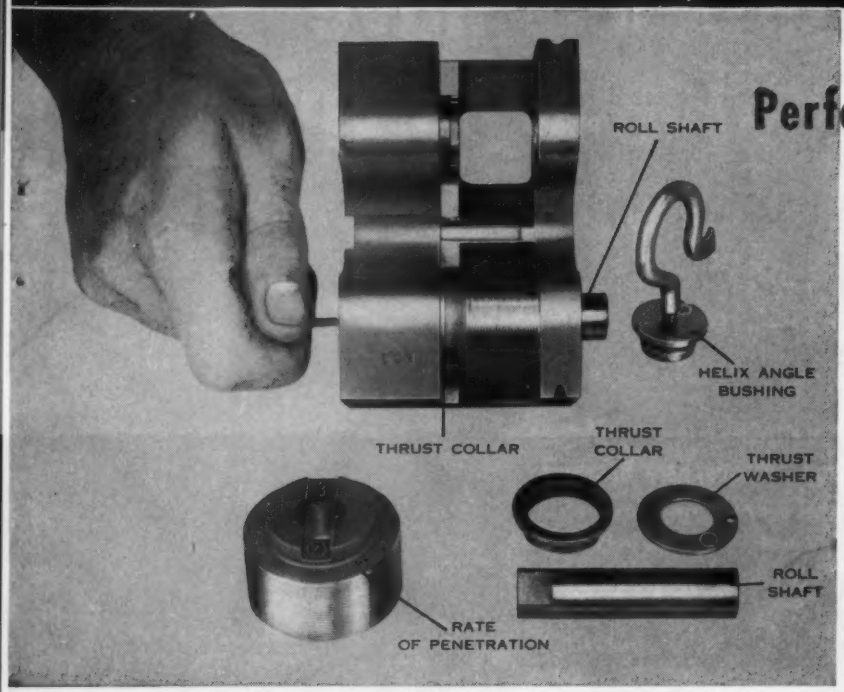


Perfect Helix Agreement

The helix angle bushings, thrust collars, and thrust washers provide a corrective between the workpiece and roll helixes, eliminating drunkenness and ensuring coarse pitch threads to Class 4 fit. All helix angle equipment is designed and marked for rapid changes.

Infinite Size Adjustment

Size adjustment links are used for major adjustments, with final sizing controlled by size adjusting screws. This system, and changing helix angle bushings, assures rolling all threads as though the attachment were exclusively engineered for that particular work.

Precise Timing

A simplified system of roll timing ensures satisfactory rolling on the first operation. Only one gage is used for timing all threads rolled by each attachment. Rolls are correctly timed when roll lines coincide with the vertical of the curved timing gage segment (illustrated).

Only Landis grinders have "rigidized" bearings and spindles

for
- maximum production
- fine finishes
- high precision

"Rigidized" Microsphere Bearings

One piece bearings have extremely close clearance between spindle and bearings. Gives accurate work and quick, positive sparkout.

"Rigidized" Spindle

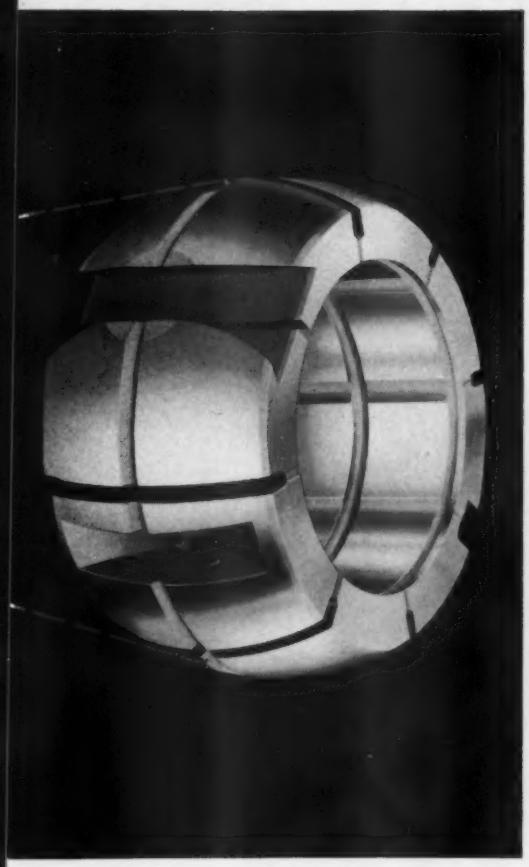
Because the diameter of the spindle between bearings is increased, you can take heavy cuts without loss of accuracy or finish.

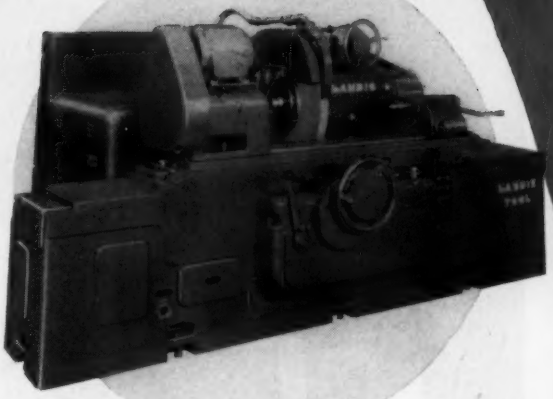
LANDIS

precision grinders

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

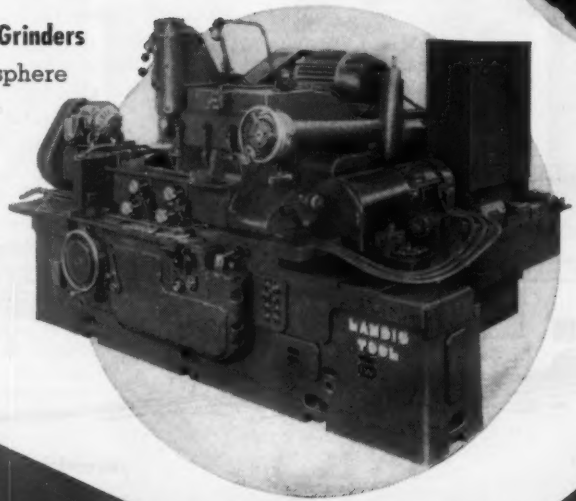
Landis Universal Grinders have rigidized Microsphere bearings and spindle.





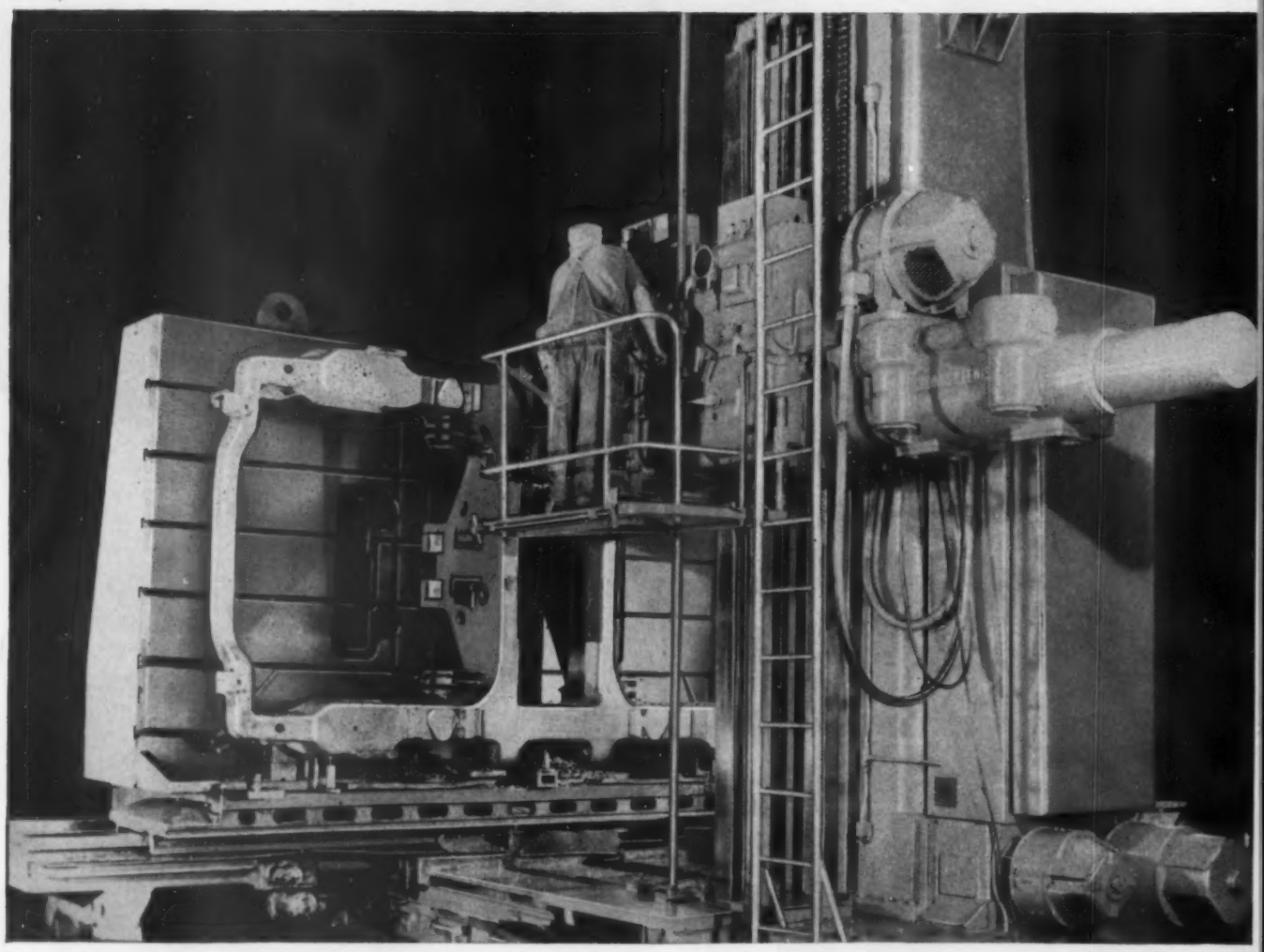
Landis Plain Grinders have rigidized Microsphere bearings and spindle.

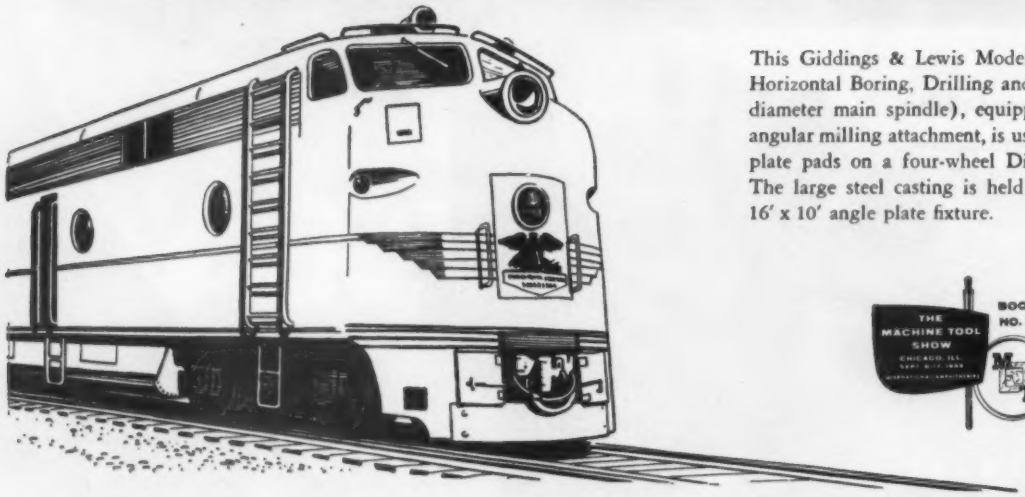
Landis Centerless Grinders have rigidized Microsphere bearings and spindle in both the grinding wheel and regulating wheel heads.



Landis Single-Purpose Grinders have rigidized Microsphere bearings and spindle.

How Giddings & Lewis build better trucks for





This Giddings & Lewis Model 570-T (Table-Type) Horizontal Boring, Drilling and Milling machine (7" diameter main spindle), equipped with a heavy-duty angular milling attachment, is used to mill bolster wear plate pads on a four-wheel Diesel locomotive truck. The large steel casting is held exactly in place by a 16' x 10' angle plate fixture.

machines help LFM modern locomotives

The Locomotive Finished Material Co. uses Giddings & Lewis 50 Series Horizontal Boring, Drilling and Milling machines and Vertical Boring Mills to turn out precision-machined, high quality iron and steel castings for all types of industry

Widely recognized for quality that pays off on the job — the iron and steel castings made by The Locomotive Finished Material Co., Atchison, Kan. serve in locomotive trucks, gyratory crushers and other products. Giddings & Lewis 50 Series Horizontals (table and floor types), and Vertical boring machines contribute to this precision and quality. Illustrated here are only a few of the many operations — boring, facing, slab milling, turning — which these machines perform in a single set-up.

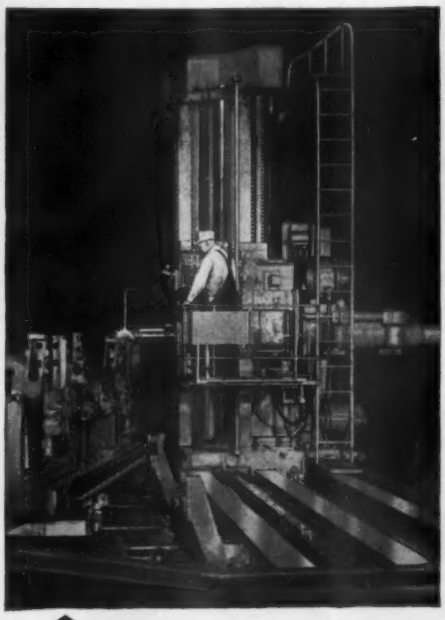
Rugged in design, the G&L's are engineered to cut out elements of non-productive work such as extra set-ups. What's more, they maintain close-tolerances and permit greater flexibility in the choice of feeds and speeds. When equipped with underarm spindle support, angular milling attachments, continuous feed facing head, rotary table or other attachments, these machines enable you to do a variety of intricate operations. Without the above features, many of these operations would require a series of special set-ups and, in many cases, special machinery with different sequence of operations.

If you want to solve high-cost heavy machining problems, there's a G&L machine that can do the job better and at lower cost. For prompt assistance, see your nearest Giddings & Lewis representative, or write direct.

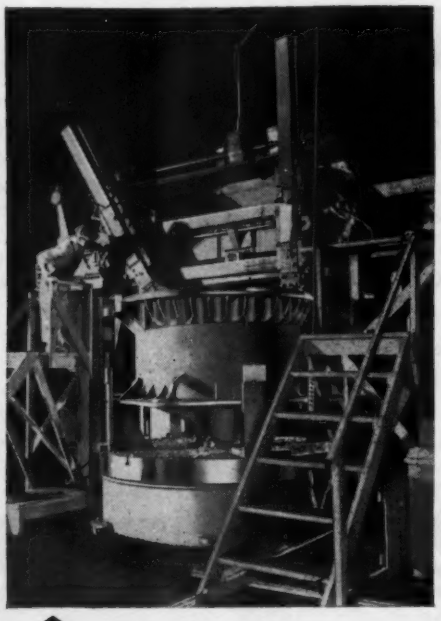
Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

GIDDINGS & LEWIS MACHINE TOOL CO.

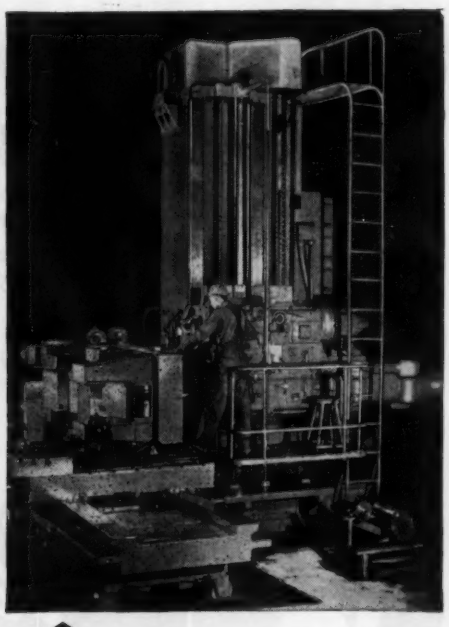
FOND DU LAC, WISCONSIN



This Model 570-F Horizontal Boring, Drilling and Milling machine performs 36 operations in two hours. Inside faces and heel of the pedestals on the Diesel locomotive truck are slab milled. Work is mounted on a large rotary table that moves 12′ at right angles to column runways.



Giddings & Lewis Heavy Vertical Boring mill with 10′ table and 84″ rail clearance is used for a variety of machining operations on large and small castings. Here it's boring an adjusting ring seat on a heavy-duty gyratory crusher housing.



This Model 560-T Horizontal with a 6″ dia. spindle is shown cutting an automatic feed slide on a shell press base. Equipped with a 5′x12′ table with a 12′ travel and headstock with 10′ vertical travel, this is an excellent machine for boring and facing intricate surfaces.

If **WEAR**
is a factor...

...use

VK CARBIDE PLUG GAGES

TUNGSTEN CARBIDE
wire type .016" to .500" diameter
CHROME CARBIDE
taper insert type .500" to 1.510" diameter

In addition to its regular line of tungsten carbide wire type plug gages from .016" to .500" diameter, The Van Keuren Company now offers a new line of chrome carbide taper insert plug gages in the range from .500" to 1.510" diameter.

Van Keuren tungsten carbide wire type gages have proved their worth on thousands of tough gaging jobs. The new chrome carbide taper inserts (Carboloy, grade ‡608*) promise to be equally effective. Wearing qualities of chrome carbide are comparable with tungsten carbide. In addition, the material is lighter than tungsten carbide and has a coefficient of expansion close to that of steel . . . both of which factors are a distinct advantage in the larger sizes.

Finish on Van Keuren gages in either tungsten carbide or chrome carbide will average .5 RMS or better. These gages are available in Class Y, X, and XX accuracies at moderate prices and on a reasonable delivery basis.

Send for a copy of the 220-page Van Keuren Catalog and Handbook No. 35 containing valuable technical and engineering information on measuring problems and methods. Address: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

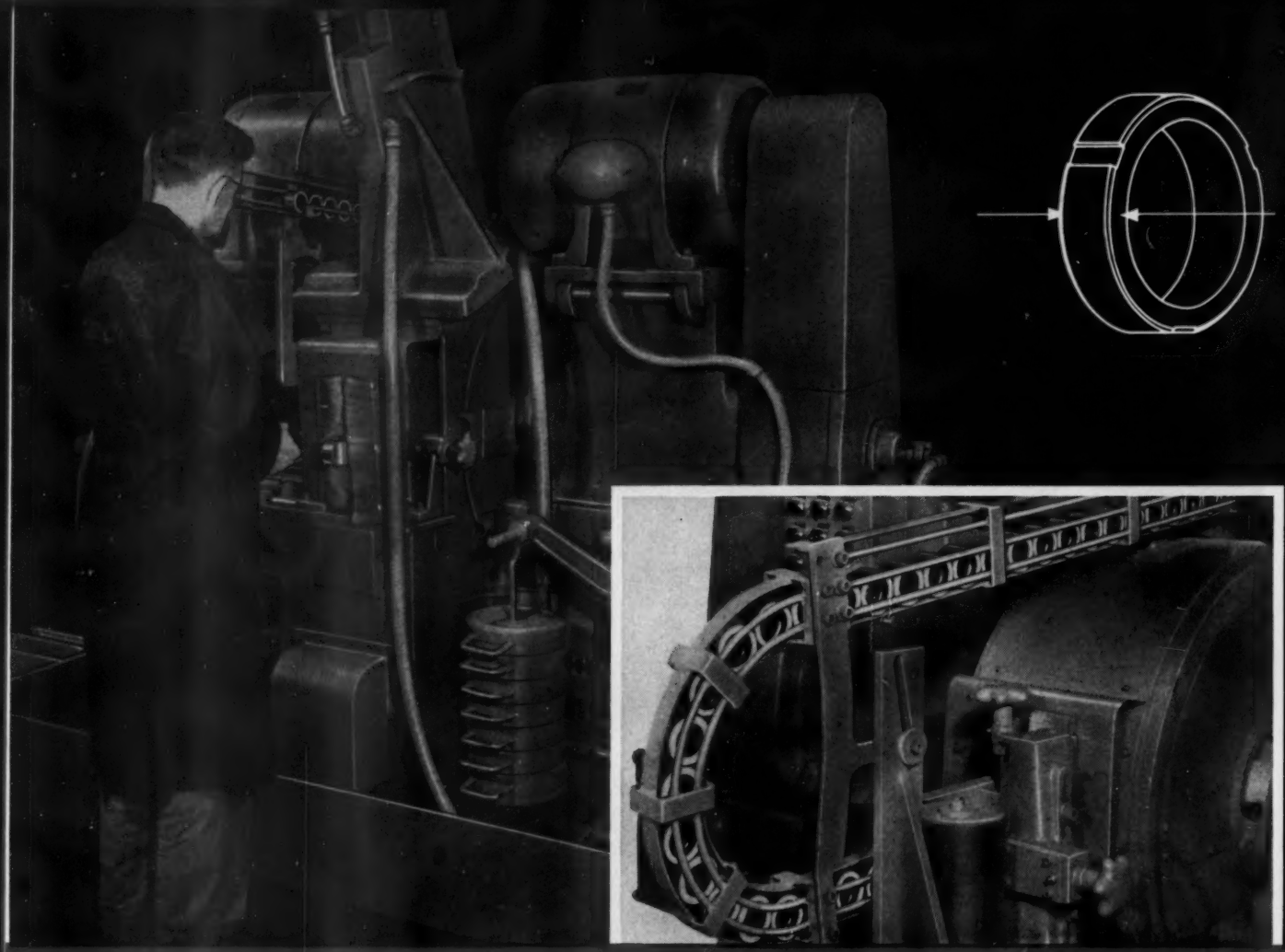
*Trademark of the Carboloy Dept. of General Electric Company.

VK
36th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages.



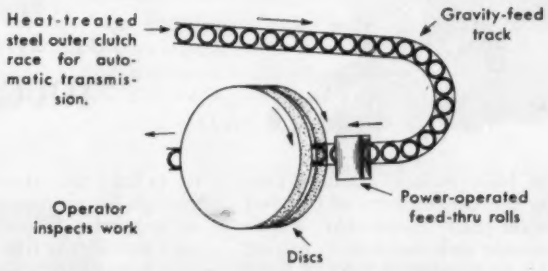
Grinds 3600 Clutch Race Faces per Hour

Job Data

MACHINE	Gardner No. 125-26" Double Spindle Grinder.
PRODUCTION	1800 per hour, both faces.
STOCK REMOVAL	.030" overall.
TOLERANCES	.0002"-.003" for parallelism; .0005" for uniformity.
ABRASIVES	2 Gardner Yellow-Rim WIRE-LOKT DISCS.®

144M

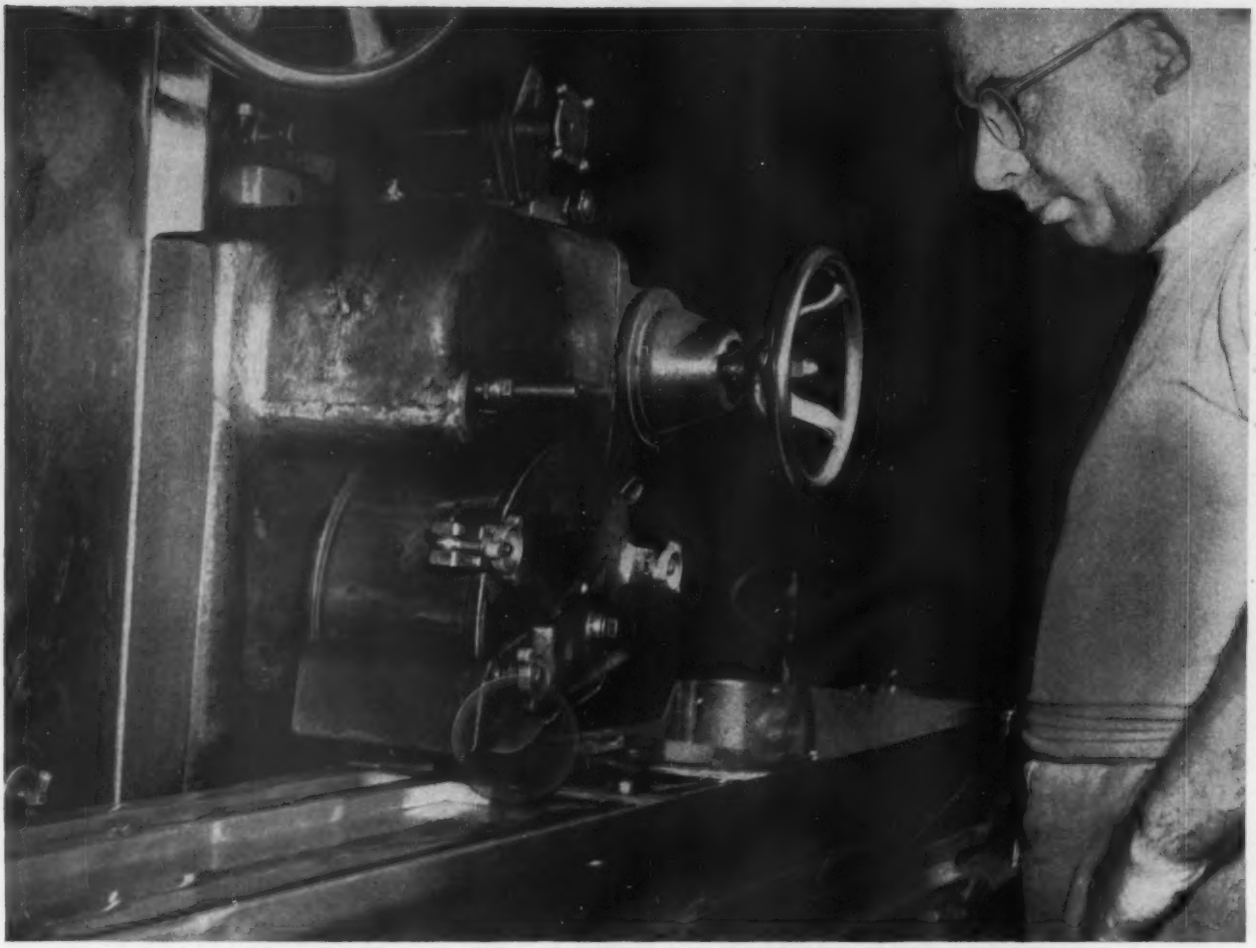
Production and accuracy increased by grinding TWO parallel faces in ONE operation



GARDNER

precision disc grinders

BELOIT, WISCONSIN



"Competitive wheels have never equalled G Bond wheels on our jobs." This Massachusetts tool manufacturer further reports he considers G Bond wheels as maximum load production wheels, besides being extremely free cutting, requiring very little dressing and giving very long life. His requirements are precision grinding hard steel to a very high finish, and to parallel tolerances of .0001". The machine is a Norton 10" Hydraulic Surface Grinder.

Better surface grinding for you . . . G BOND users' reports prove it!

Top speed, new economy among many "TOUCH of GOLD" *advantages listed*

Reports from surface grinding customers on the performance of G Bond wheels sound pretty much alike. That's logical, because each customer is getting exactly the advantages he's looking for — *freer, cooler, faster cutting action . . . heavier cuts without burning . . . closer tolerances and smoother finishes . . . easier dressing and more pieces per dressing . . . more work, and more kinds of work, per wheel.*

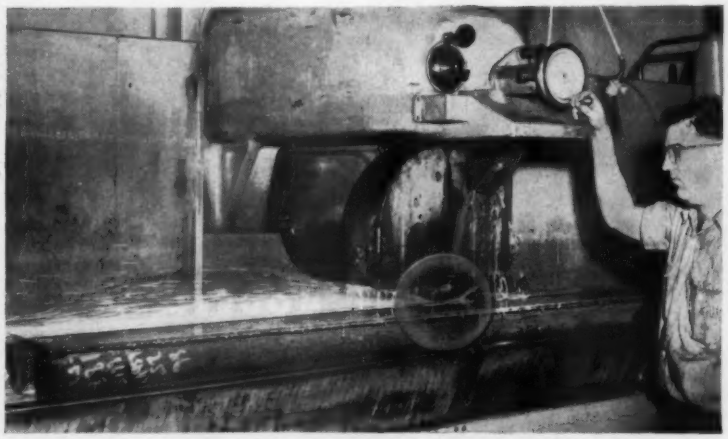
Your Own Surface Grinding

will benefit by the G Bond's unique ability to hold each abrasive grain just long enough for maximum cutting action — an important "Touch of Gold" advantage that means time and money saved, plus better product quality, throughout the range of precision and semi-precision grinding jobs.

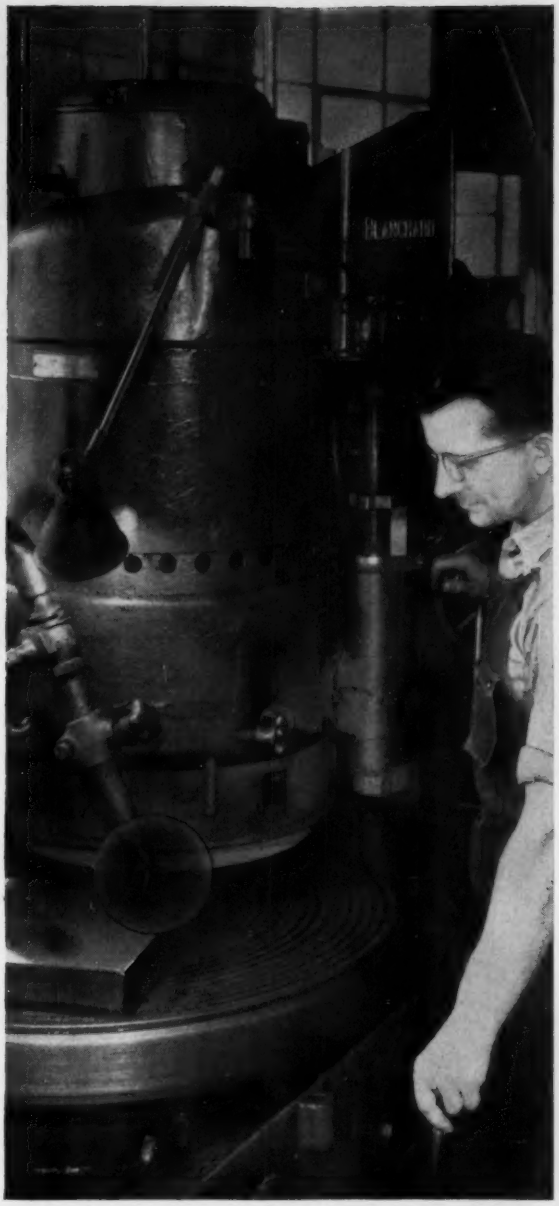
See Your Norton Distributor

for the G Bond wheels, cylinders and segments you need. They're available in a variety of famous Norton abrasives. Of these, 32 ALUNDUM® abrasive is particularly suited for fast stock removal and heavy feeds — it grinds exceptionally cool and fast, with minimum dressing. And remember: only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Grinding precision spur gears of SAE 8620 steel, hardened to 59-63 Rockwell C, this Maryland pump and motor builder thoroughly tested G Bond wheels against other makes. He reports that G Bond wheels cut cooler, hold form much better, last 50% longer due to less frequent dressing, and are easier on diamonds.



"Norton G Bond wheels are faster and freer cutting, need less dressing than any other wheels we've used," says this Pennsylvania metal working company. Material ground is boiler plate and miscellaneous steel plate. Stock removal rate is 4.5 to 6 cubic inches per minute.



Jigs, fixtures and other parts of miscellaneous steels, besides some of cast iron, are the jobs on which G Bond segments are used by this Ohio tool and gage maker. He credits the G Bond segments with giving a better finish, with less dressing, than any he previously used.

W-1644

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

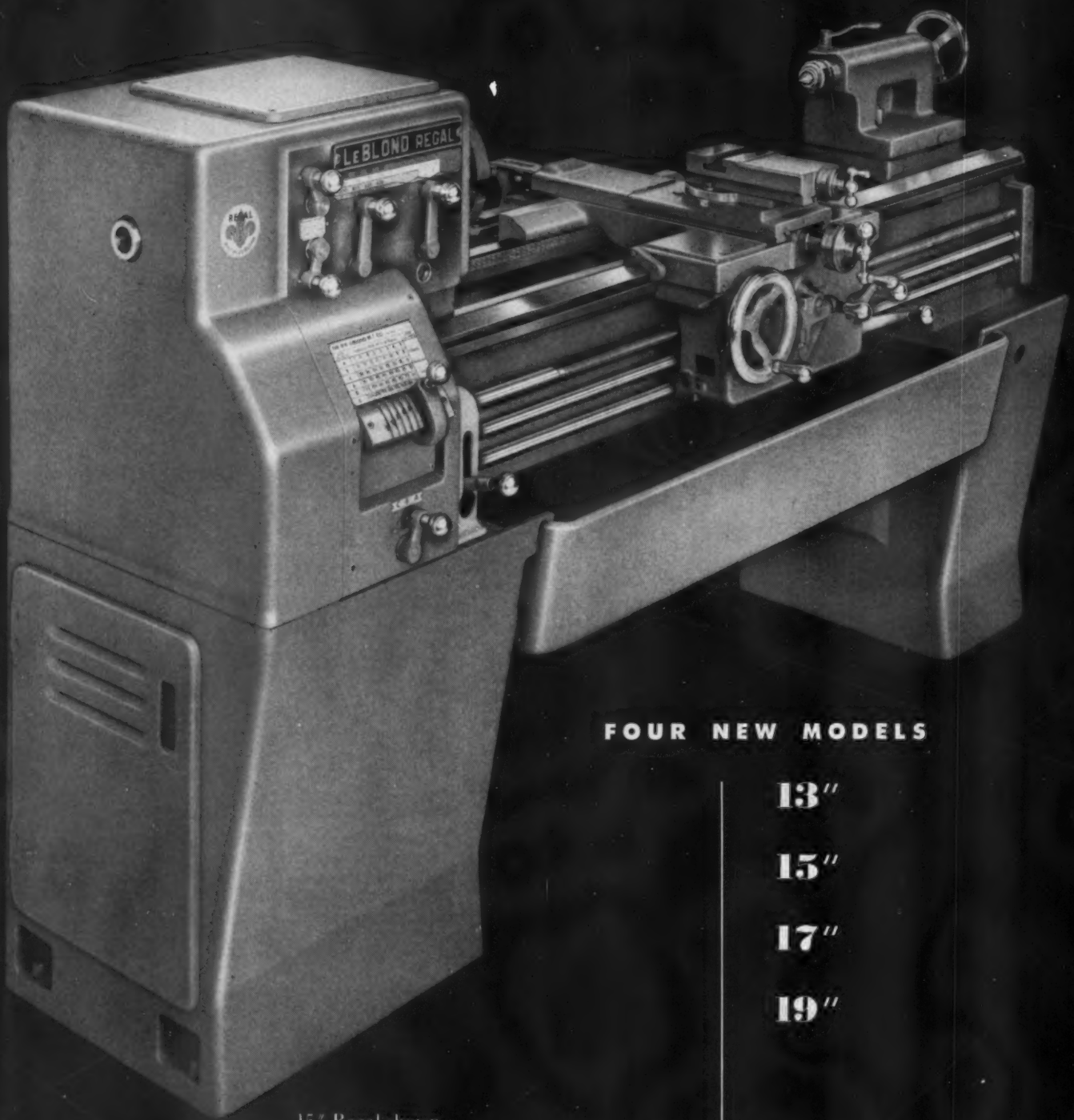
Making better products... to make your products better

and its **BEHR-MANNING** *division*

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

cut with confidence . . .

HERE'S THE



15″ Regal shown

FOUR NEW MODELS

13″

15″

17″

19″

NEW LeBLOND REGAL

The only lathe in its class with so many big-lathe features

Designed and built like heavy-duty lathes, the new LeBlond Regals will give you long life of precision production, minimum maintenance and the kind of dependability you'd expect from a much higher-priced machine!

Consider, for example, the new Regal headstock. It uses the same combination gear-belt drive construction that proved itself on the famous LeBlond Dual-Drive and is now incorporated on our new 16" heavy-duty lathe. Then take a look at the new bed with hardened and ground replaceable steel ways. Like the ways on our heavy-duty machines, they are fitted according to the compensating veeway principle to insure better distribution of forces for proven long-time accuracy and minimum wear.

Again, like higher-priced lathes, Regals are equipped with *both* feed rod and leadscrew for continued accuracy in thread chasing. Other big-lathe features—3-bearing spindle. Automatically lubricated quick-change box. Wide carriage bridge with ample bearing surface. Rugged tailstock with plug clamping. Plus general dimensions and construction details patterned after LeBlond heavy-duty lathes.

Only from the builder of a complete line of lathes can you get a low-priced lathe with true big-lathe features. All of LeBlond's 68 years of experience has gone into the design and building of these new Regals. Be sure you get all the details; see your LeBlond Distributor or write for Bulletin R-200-A.

	13"	15"	17"	19"
Swing over bed and carriage wings	14"	15½"	17¾"	19¼"
Spindle speeds, number	12	12	12	12
Spindle speed range, rpm.	45 to 1800	30 to 1200	38 to 1500	25 to 1000
Feeds and threads, number	48	48	48	48
Feed, range, in. per rev.	.0018—.106		.002—.116	
Threads per inch, range	4—224		2—112	
Horsepower	2	3	3	5

SEE IT AT THE SHOW

#1313

Dead center of the new Exhibition Hall.

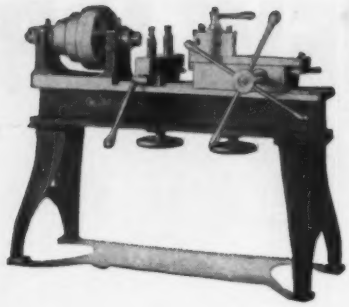
. . . cut with confidence

THE R. K. LEBLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

LeBLOND of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 68 YEARS

1880



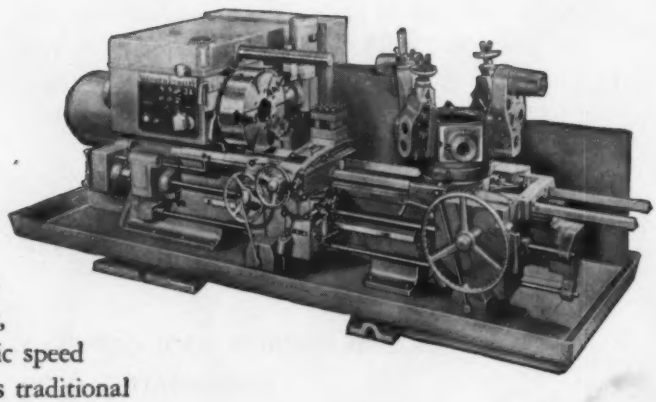
One of the first Warner & Swaseys . . .
but a machine designed to meet the high precision production requirements of its day.

Serving American Industry for

75 YEARS

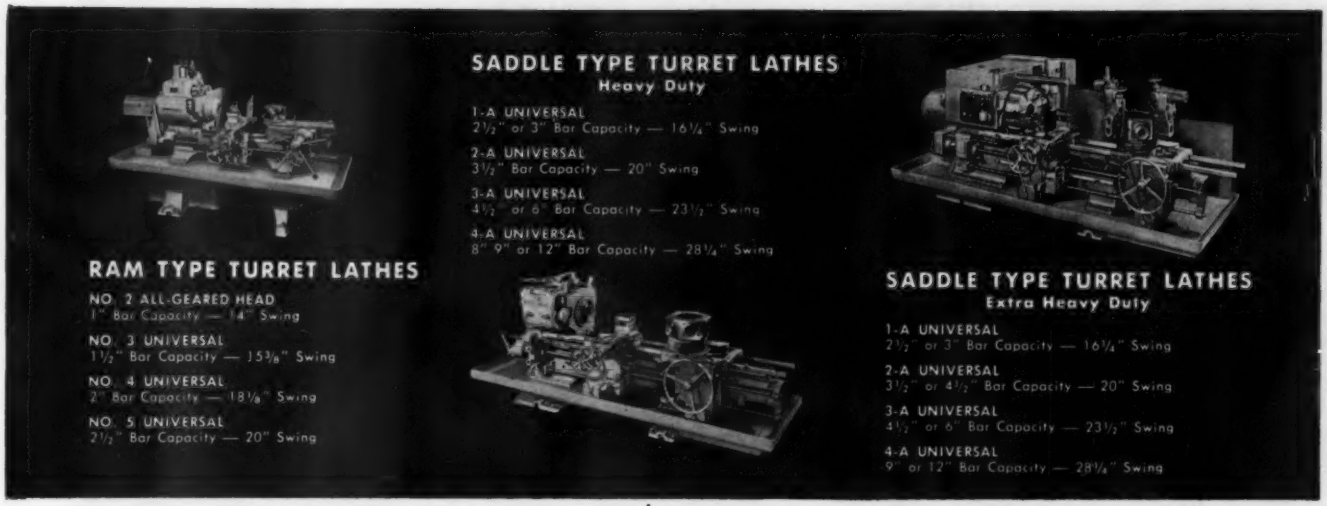
. . . pacing the industry with ever improving designs in high precision machine tools to give you faster, more accurate, more profitable production.

1955



A machine designed for today's production schedules — *and tomorrow's!* It's one of a whole new line of extra-heavy duty Warner & Swasey Turret Lathes — engineered to provide new power, more usable cutting speeds, automatic speed changes and simplified controls, plus traditional Warner & Swasey accuracy and dependability!

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY


SADDLE TYPE TURRET LATHES
Heavy Duty
1-A UNIVERSAL
2½" or 3" Bar Capacity — 16¼" Swing
2-A UNIVERSAL
3½" Bar Capacity — 20" Swing
3-A UNIVERSAL
4½" or 6" Bar Capacity — 23½" Swing
4-A UNIVERSAL
8" 9" or 12" Bar Capacity — 28¼" Swing
RAM TYPE TURRET LATHES
NO. 2 ALL-GEARED HEAD
1" Bar Capacity — 14" Swing
NO. 3 UNIVERSAL
1½" Bar Capacity — 15⅜" Swing
NO. 4 UNIVERSAL
2" Bar Capacity — 18⅛" Swing
NO. 5 UNIVERSAL
2½" Bar Capacity — 20" Swing
SADDLE TYPE TURRET LATHES
Extra Heavy Duty
1-A UNIVERSAL
2½" or 3" Bar Capacity — 16¼" Swing
2-A UNIVERSAL
3½" or 4½" Bar Capacity — 20" Swing
3-A UNIVERSAL
4½" or 6" Bar Capacity — 23½" Swing
4-A UNIVERSAL
9" or 12" Bar Capacity — 28¼" Swing

TODAY...an extensive line of cost-cutting machine tools in a complete range of sizes and capacities . . . each model individually designed and built for a specific range of work.

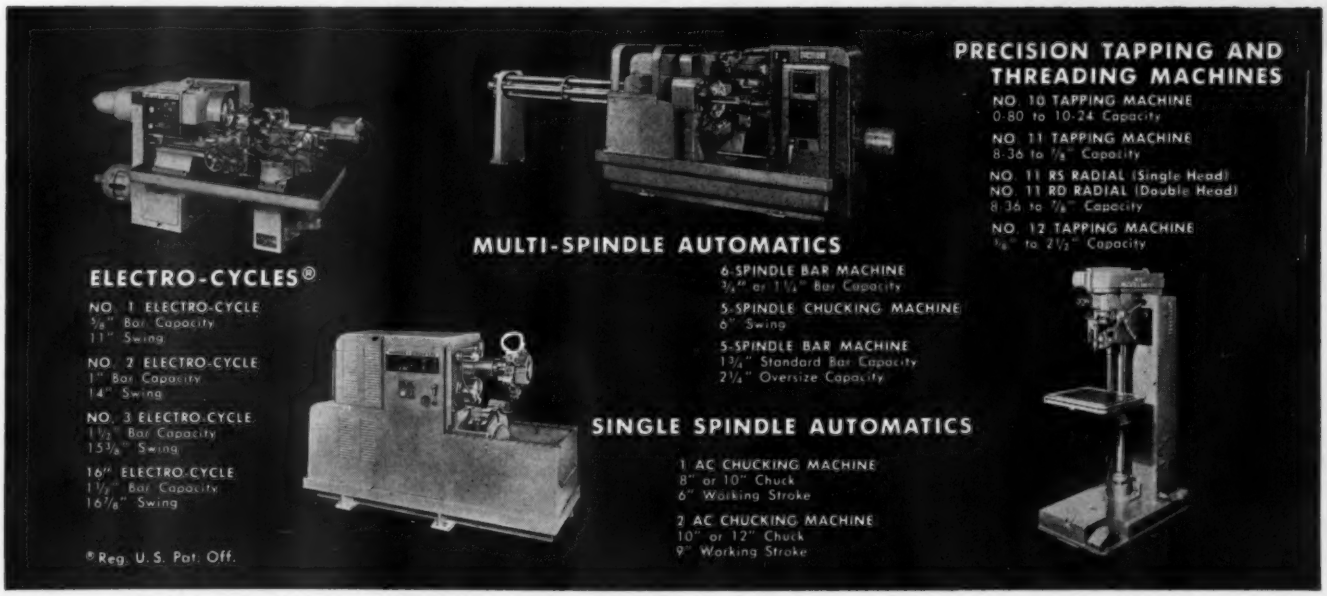
75TH ANNIVERSARY YEAR

WARNER & SWASEY

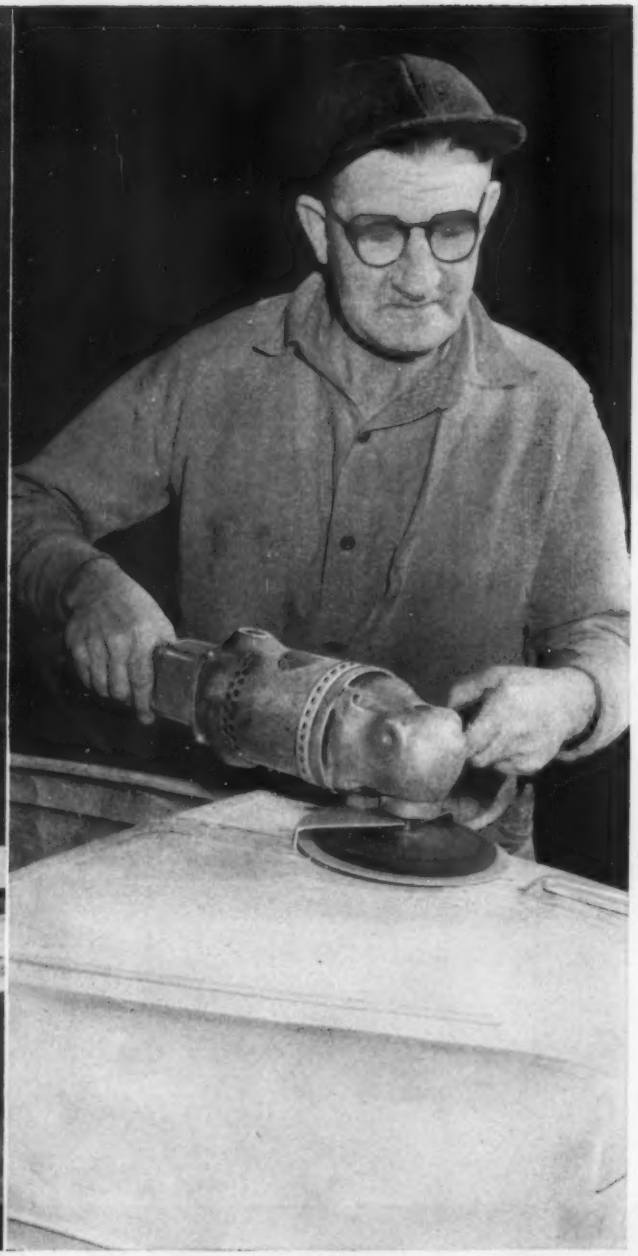
Cleveland

PRECISION MACHINERY SINCE 1880

1880 — 1955



Reducing welds with straight wheel

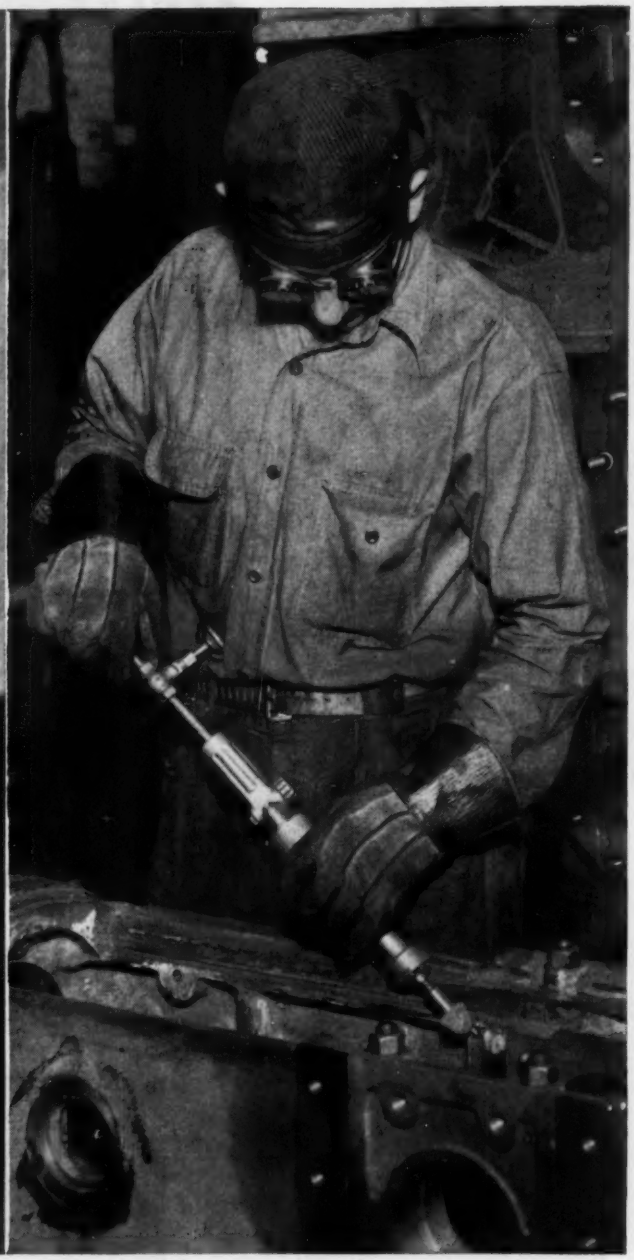


Blending welds with depressed center wheel

CUT COSTS *on every*

YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN will show you which of these products is best for each of your operations...and why! Call him today—he's listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels." Years of experience, unbiased counsel, complete stocks of abrasives and fast, dependable service make him your one source for help on every grinding and finishing problem. Or, if you prefer, write to The Carborundum Company, Dept. AM 81-54, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

Rough grinding with cup wheel



Cleaning casting with cone wheel

PORTABLE GRINDING *job!*

Are *you* getting maximum production at lowest possible cost from your portable grinding operations? There's ONE way to be sure—use the proper abrasive product by Carborundum for every type of portable grinding machine—air or electric—in your shop.

YOUR WIDEST CHOICE of abrasives by CARBORUNDUM assures you of the *one* best suited to every metalworking operation, whether you're rough grinding or snagging...weld grinding or deburring...smoothing edges, finishing or polishing. Choose from *seven* different types of wheels, including straight wheels, cups, rubber-bushed wheels, mounted wheels or versatile MX® and CARBOFLEX products.

CARBORUNDUM

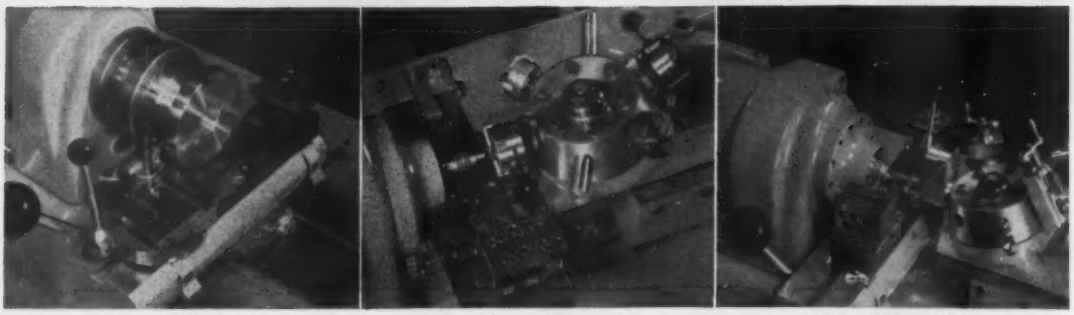
REGISTERED TRADE MARK

...continually putting more **SENSE** *in your abrasive* **DOLLAR**

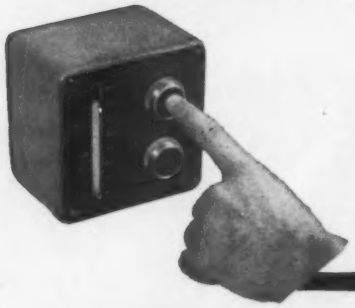
81-54

HARDINGE
ELMIRA, N.Y.

NEW Variable Speed Machine
for
PRODUCTION DEPARTMENTS



Large Work | Threading | Small Work



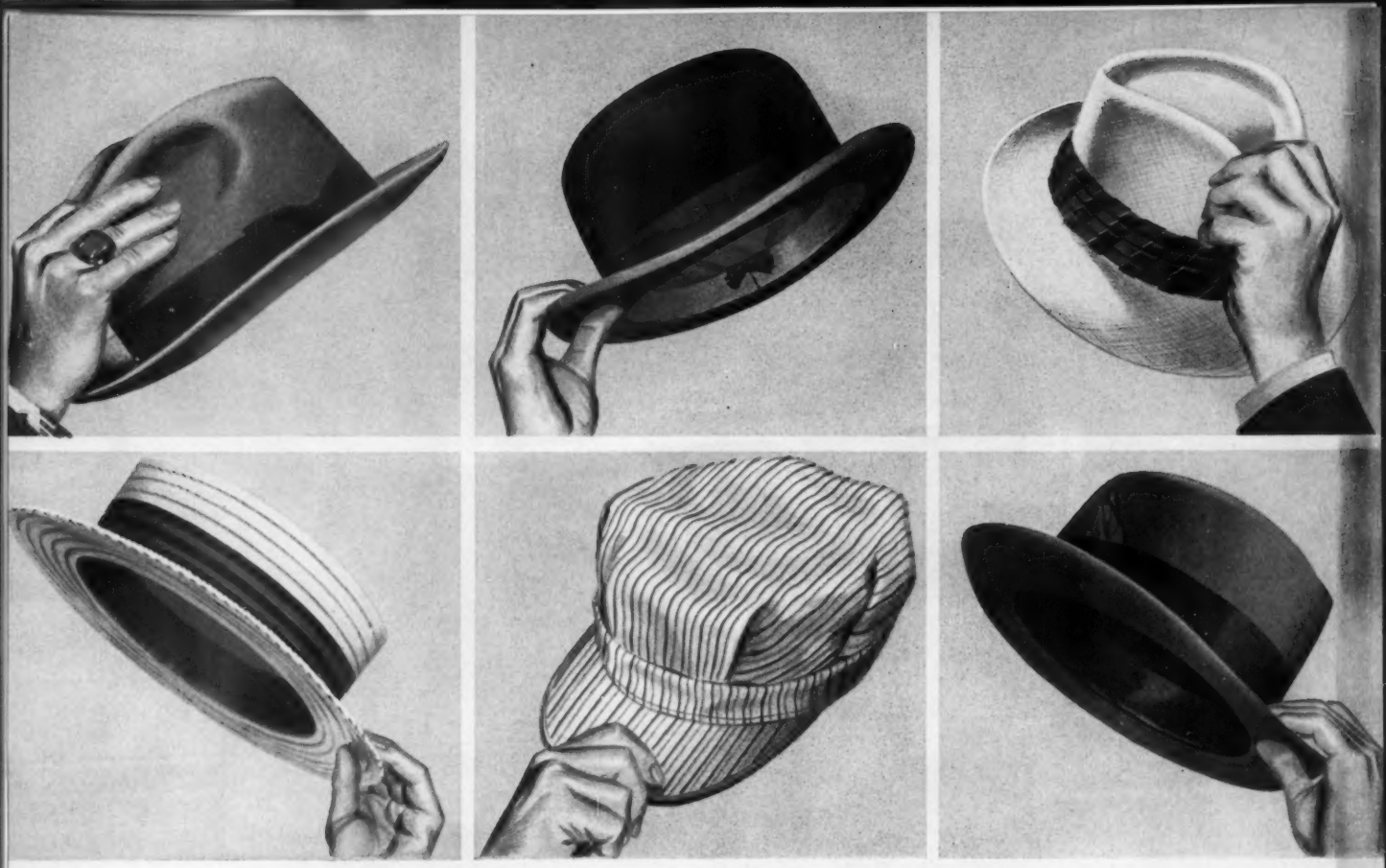
Simply Push a Button for Exact Spindle Speed

Produce More Precision Parts at Lower Cost with this NEW Second Operation Machine

Send for Free illustrated Bulletin DSM59

HARDINGE BROTHERS, INC. ELMIRA, NEW YORK, U.S.A.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.



Why hats are off to CIMCOOL...

. . . because CIMCOOL° has become, in just a few years, the largest selling cutting fluid in the world. And sales of this radically new and different coolant are continuing to climb because CIMCOOL Standard Concentrate has two big advantages over old-fashioned cutting fluids:

- **CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.
- **CIMCOOL DOES A BETTER JOB** because of its chemical lubricity. It permits faster speeds and increases tool life, for it combines friction reduction and cooling capacity in a degree never before attained.

We'll be happy to supply information on the many specific advantages of CIMCOOL Standard Concentrate—or details on the entire family of CIMCOOL Cutting Fluids. Just contact us and we'll have one of our Cincinnati Milling-trained machinists call on you —without cost or obligation. Wire, write, or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive** — For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for speeds and feeds.

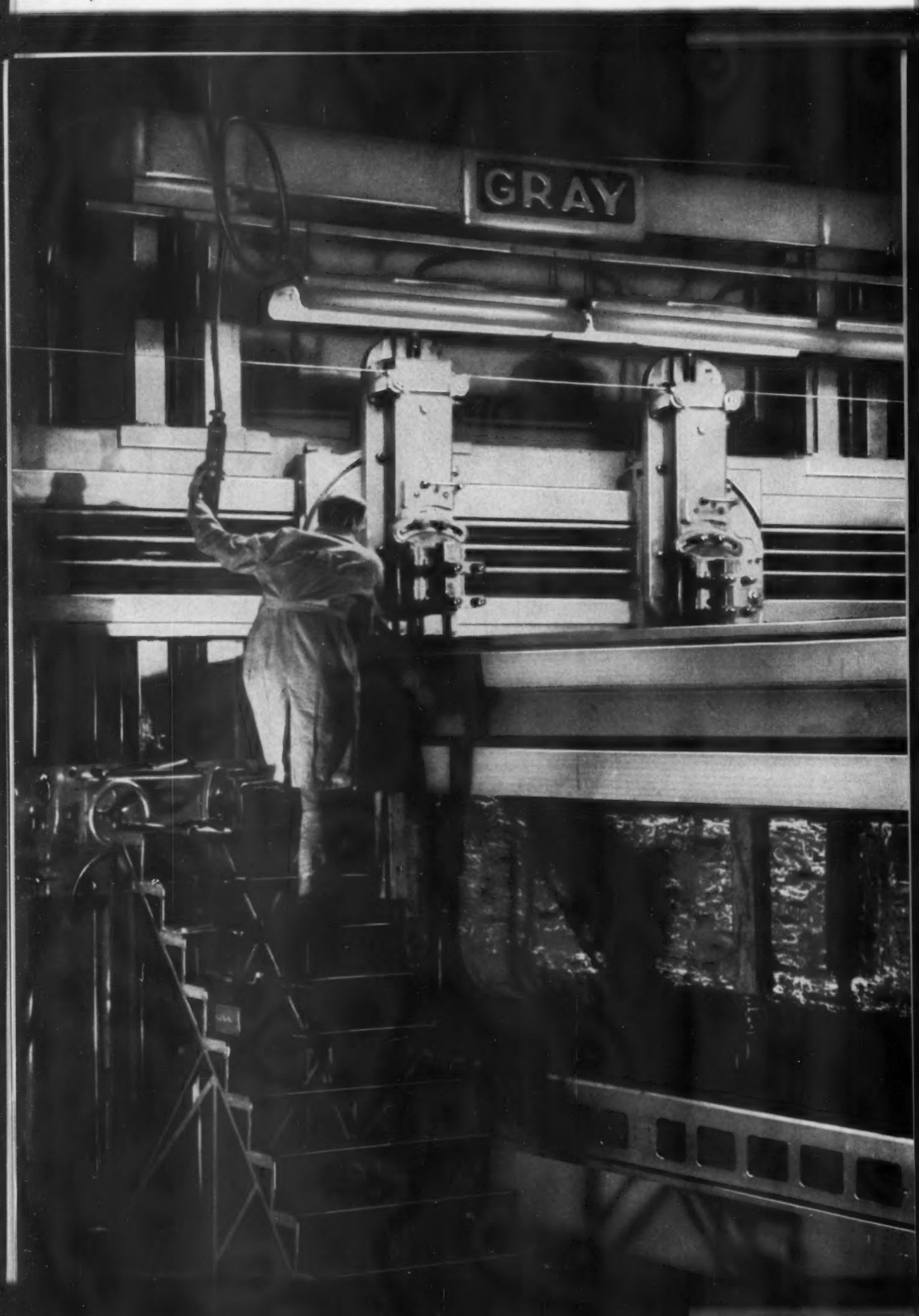
CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity.

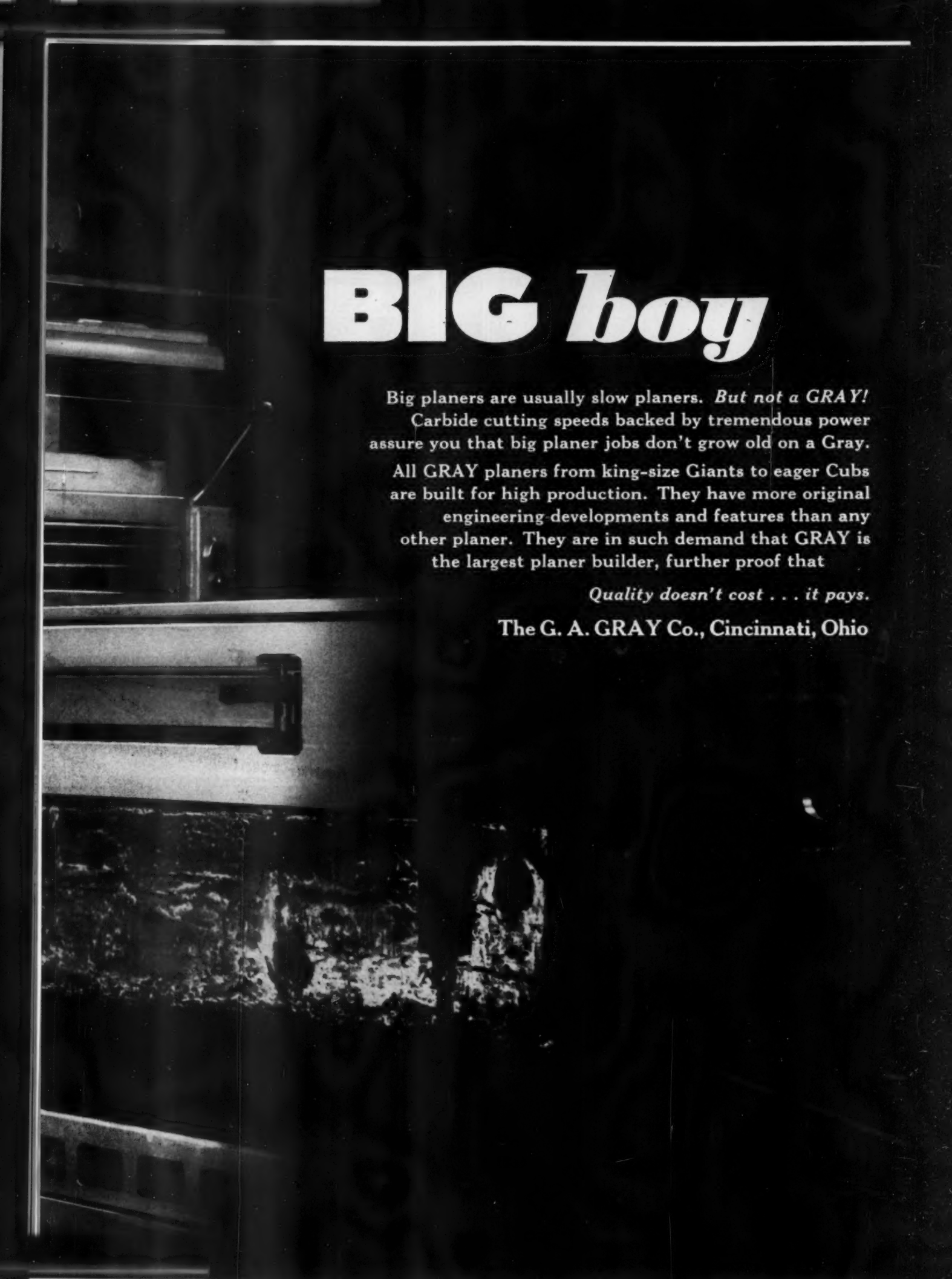
CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL Cutting Fluids

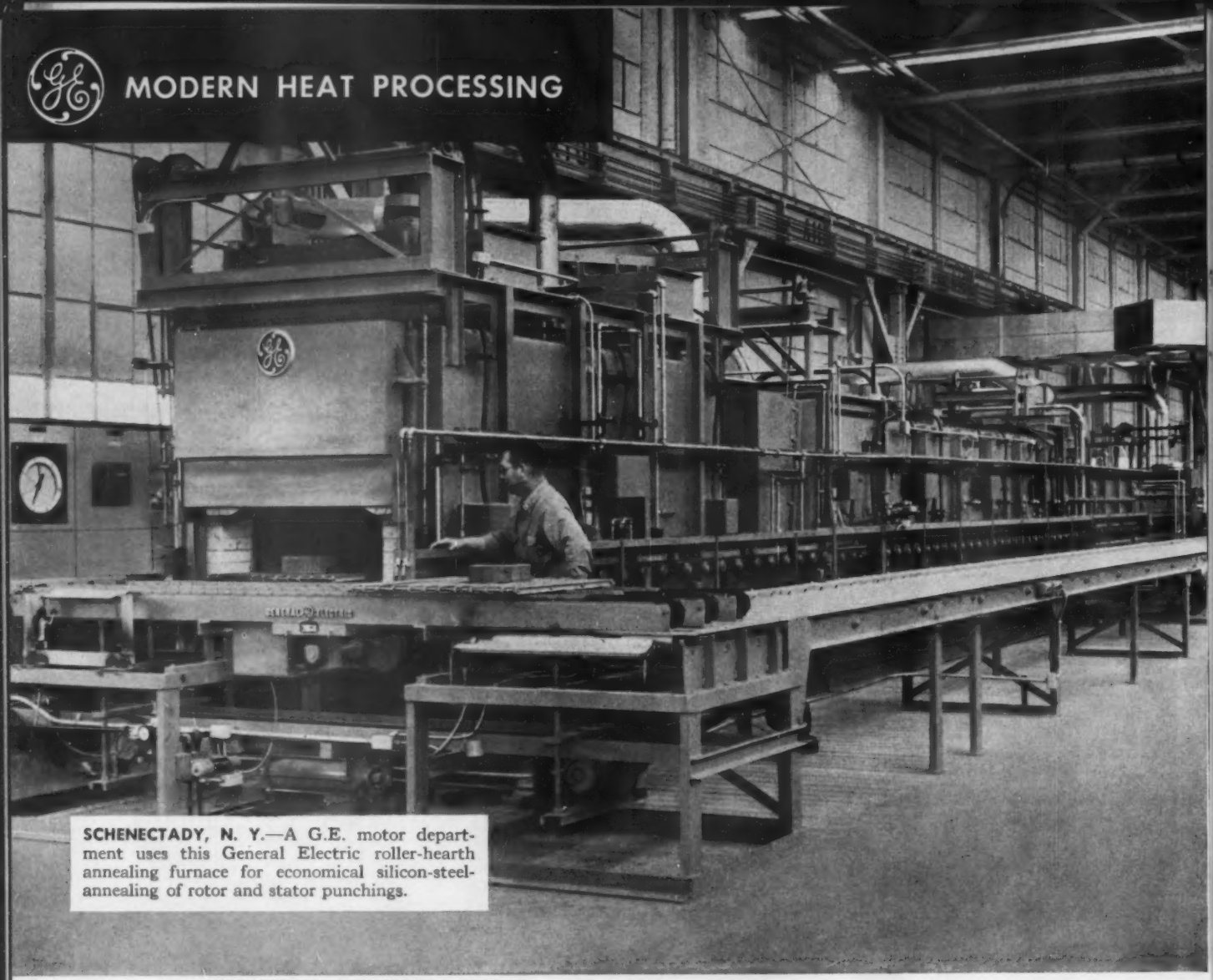
100% for ~~85%~~ of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.


GRAY


BIG boy
Big planers are usually slow planers. But not a GRAY!
Carbide cutting speeds backed by tremendous power assure you that big planer jobs don't grow old on a Gray.
All GRAY planers from king-size Giants to eager Cubs are built for high production. They have more original engineering developments and features than any other planer. They are in such demand that GRAY is the largest planer builder, further proof that
Quality doesn't cost . . . it pays.
The G. A. GRAY Co., Cincinnati, Ohio

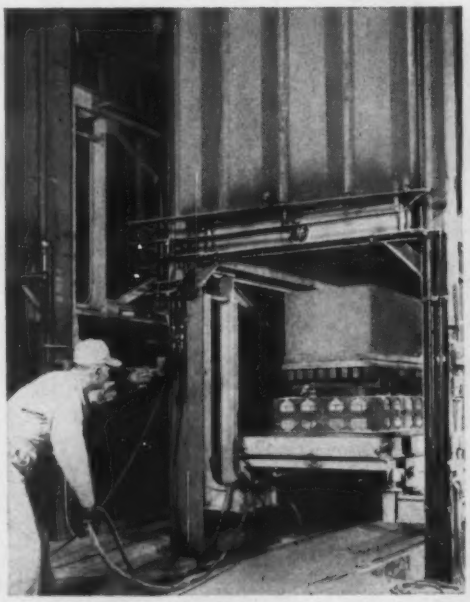
MODERN HEAT PROCESSING



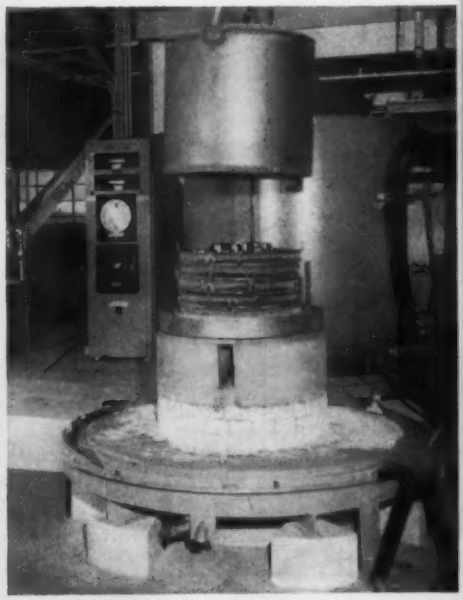
SCHENECTADY, N. Y.—A G.E. motor department uses this General Electric roller-hearth annealing furnace for economical silicon-steel-annealing of rotor and stator punchings.

WIDE VARIETY OF G-E ANNEALING FURNACES NOW LETS YOU ANNEAL SILICON STEEL RIGHT IN YOUR OWN PLANT

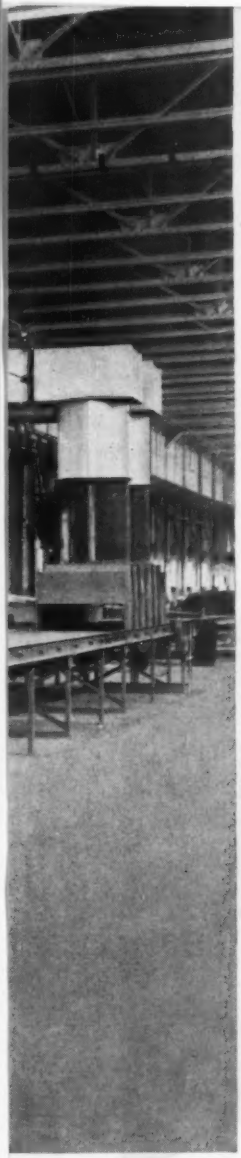
Take a tip from General Electric, user of about 25% of the country's production of silicon steel—you can cut costs by annealing your own silicon steel. There's a General Electric silicon steel annealing furnace for nearly every type of annealing application—large or small. For example, the furnaces at right are located in different G.E. plants, each handling a different size silicon-steel-annealing job — *economically.*



G-E ELEVATOR FURNACE at Rome, Ga. plant is used for high temperature annealing of transformer cores—furnace fits in minimum space.



G-E BELL FURNACE, Waynesboro, Va. Low-production unit anneals machine parts at low cost.



PROBLEM:

Annealing silicon steel in an automated setup

SOLUTION:

G-E roller hearth furnace anneals stator punchings and weld in one pass, cuts costs

A General Electric roller hearth furnace in the new automated production line for one of G.E.'s motor departments anneals 1500 pounds of rotor and stator punchings an hour—helps produce a Tri-Clad* 55 motor every 2½ minutes. The stator punchings and weld are annealed at the same time. This eliminates the cost and time involved in making two passes through the furnace. Only one man is needed to oversee the complete annealing operation.

IN ADDITION TO G-E furnace quality, here are the advantages you receive when you deal with G.E. on silicon steel annealing:

(1) TECHNICAL KNOWLEDGE—G-E research helped pioneer the development of silicon steel for improved magnetic properties.

(2) EXPERIENCED USER—G.E. uses about 25% of the total production of silicon steel.

(3) EXPERIENCED BUILDER—G.E. offers a complete line of furnace and control equipment for your silicon steel annealing.

(4) APPLICATION HELP—plus installation supervision—assure you of the most efficient furnace installation.

(5) MAINTENANCE SERVICE—Nearly 200 G-E service shops, located throughout the country, are ready to help you 24 hours a day.

ASK FOR THE SERVICES of your local G-E Apparatus Sales Representative in assessing the economies of annealing silicon steel in your plant. Just call your nearby General Electric Apparatus Sales Office.

*Reg. trademark of General Electric Company.

GENERAL ELECTRIC

G-E MESH-BELT FURNACE located at Ft. Wayne, Ind. plant blue-anneals rotor laminations. Ideal for medium production, the mesh-belt furnace is flexible for use over a wide range of temperatures and speed.

FREE PROCESS BULLETINS

Please send me the Modern Heat Processing bulletins I have checked below.

- ☐ Protective Atmospheres, GEA-5907
- ☐ Annealing Malleable Iron, GEA-5797
- ☐ Furnace and Induction Brazing, GEA-5889
- ☐ Wire Enameling, GEA-6179
- ☐ Heat-treating Aluminum, GEA-5912
- ☐ Forging with Induction Heat, GEA-5983

General Electric Company
Apparatus Sales Division, Section G721-4
Schenectady 5, New York

Name.....

Position.....

Company.....

City.....State.....

Quick Lever Reset

Saves Time— Speeds Work

Added Evidence that—

Everyone Can Count on VEEDER-ROOT

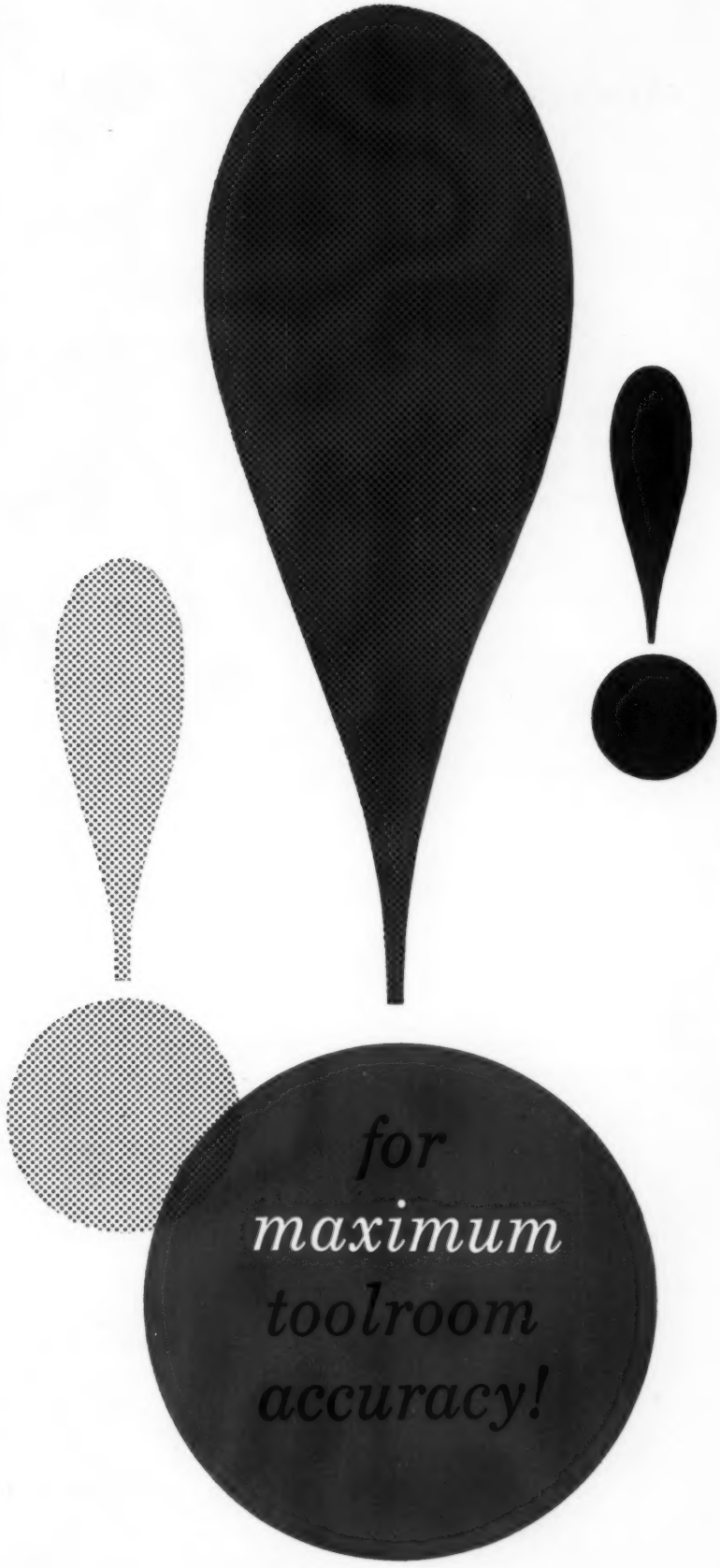
Where time consumed in resetting is at a premium . . . on short machine-runs, inspection, military equipment and other applications . . . this new time-tested Quick-Reset Ratchet Counter is exactly the time-saving device you need. Just depress the easy-acting lever on the right side through 45° . . . *all 4 figures reset instantly to zeros.* And a thumb-lever may be used on the left side also if the counter is to be operated manually.

This compact, standard counter, now readily available from stock, is one of scores of Veeder-Root Counters (both standard and special) for manual, mechanical and electrical operation in every field from electronics to atomics. Just name what you want to count . . . and "The Name that Counts" will help you do the job. Write:

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"The Name that Counts"

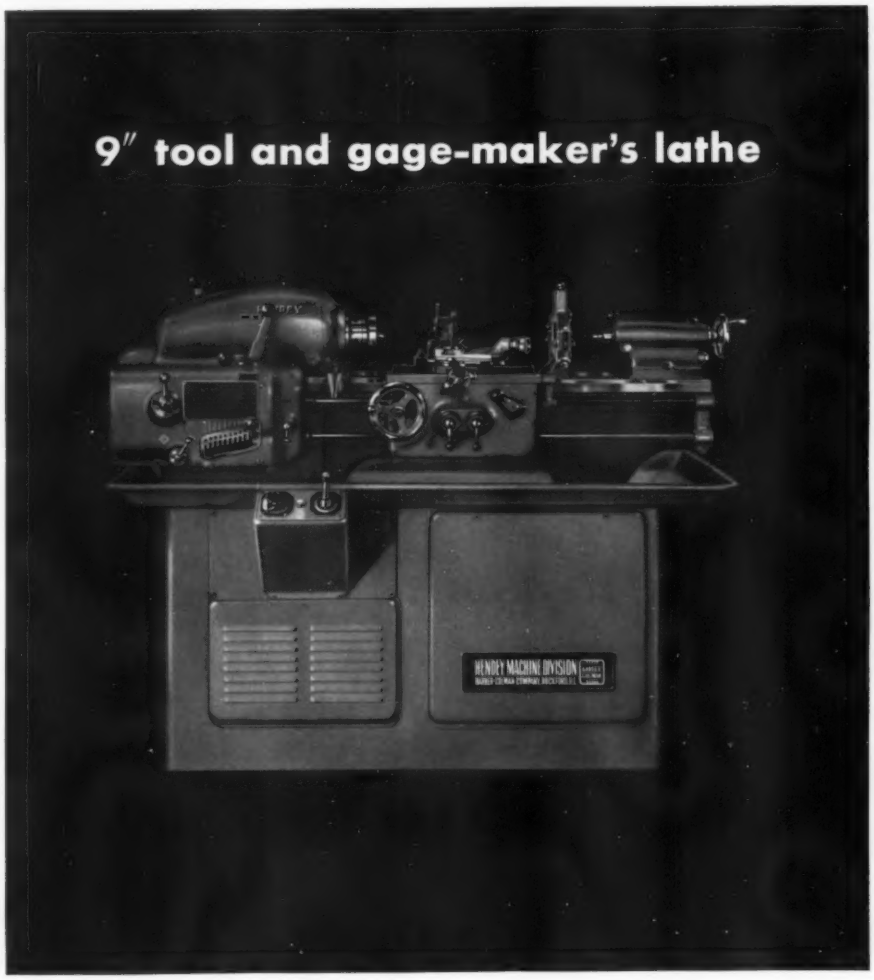

for
maximum
toolroom
accuracy!

see Hendey

for improved accuracy and speed...

The Hendey 9" Tool and Gage — Maker's Lathe provides maximum precision and versatility for toolroom and production use. Some of its features include 24" center distance and 10-1/4" swing, sixty-six thread and feed changes, and an independent lead screw.

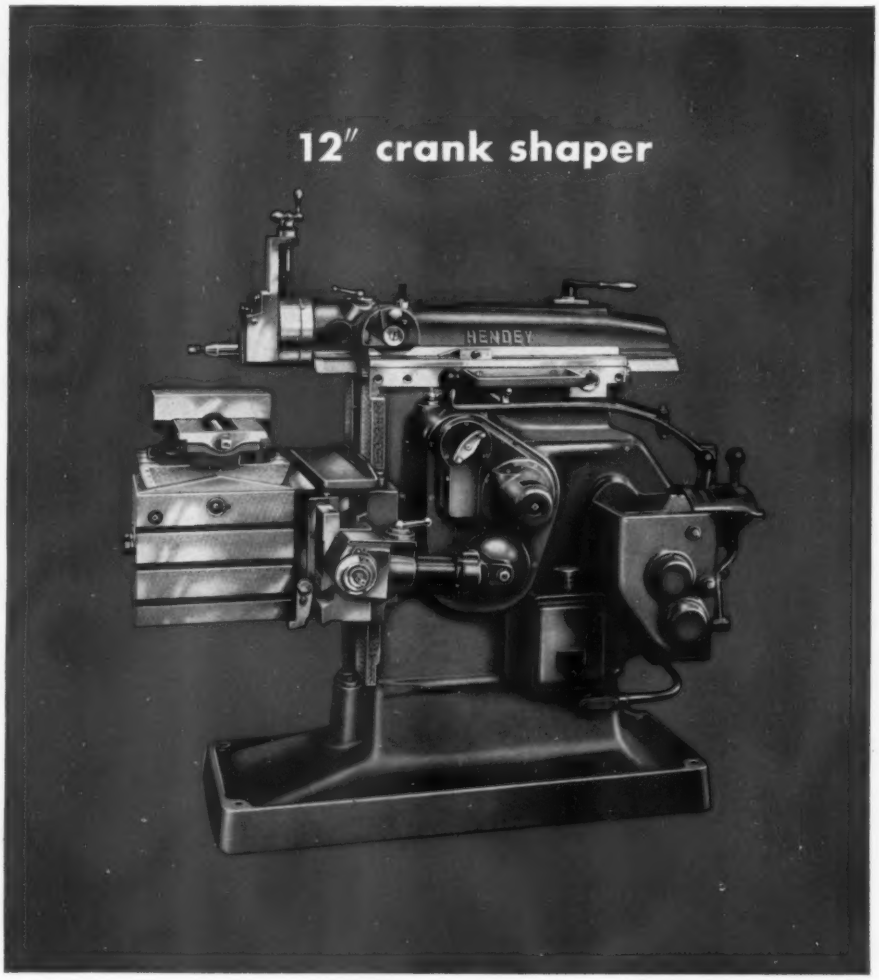
This Hendey lathe has a new magnetic amplifier drive unit for speeds which are infinitely variable and which can be changed smoothly and easily while under load. This type of drive is very simple and requires a minimum of maintenance. Spindle speeds range from 15 RPM to 3000 RPM. Speeds from 15 RPM to 250 RPM are available through back gears. Start — stop, forward — reverse, and spindle speed selection are easily controlled. This machine can also be furnished with an electronic drive unit.



highly adaptable and sensitive

See them in action in Booth No. 221

greater flexibility in tool room work



The Hendey 12″ Crank Shaper is a high-speed universal machine designed for maximum flexibility in a wide variety of cuts. It is constructed especially for precision work, and speeds up to 200 strokes per minute are available. The vise and table are the finest available on any shaper, allowing the work to be positioned to any desired angle. The universal table will rotate 360° about its axis. The tilting top can be set to 15° on either side of the horizontal position. This machine is also available in 16″ and 20″ sizes.
In addition to the vise and table, standard equipment includes dual mechanical controls, automatic lubrication, power down feed, quick-change swivel head, pre-loaded Timken bearings on the crank gear, and helical teeth on the crank gear and back gear.

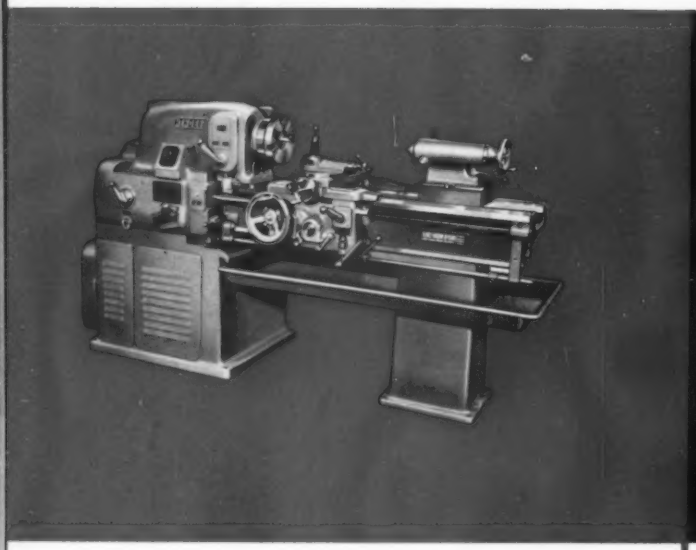
for precision work at high speed

Hendey **machine division**
BARBER-COLMAN COMPANY
115 LOOMIS ST., ROCKFORD, ILLINOIS

BARBER COLMAN

see these new Hendey production lathes!

These new modern lathes are indicative of the progress which Barber-Colman has already attained with the Hendey line and which they will continue to maintain in the future. Many outstanding new features will help you to increase accuracy and efficiency and to reduce production costs. See these new machines in action to determine how they can fill your production requirements.



NO. 2E PRECISION LATHE is equipped with Hendey exclusive "Selectronic" speed control which provides a quieter, more efficient drive with closer control over cutting speeds, especially in the lower speed range. Speeds are instantly available and may be selected either pre-set or while under cut through the full range up to 1500 RPM. Back gear drive is available from 15 RPM to 187 RPM. Further operating efficiency is provided through single-lever control of start, stop and reverse. Dynamic breaking allows smooth and rapid stopping of the spindle.

32-SPEED GEARED HEAD LATHE is designed specifically for high-speed precision production. The standard machine is equipped with a 15 HP motor, and spindle speeds up to 1500 RPM are available. It is designed to accommodate a 20 HP motor for speeds to 2000 RPM. This machine can be furnished in 13", 16" and 20" sizes. Other features include 66 thread and feed changes, automatic lubrication, independent lead screw, high-speed reversing mechanism, induction hardened and precision ground bed ways, precision automatic stops, and heavy-duty, two-speed tail stock.

Hendey **machine division**

BARBER-COLMAN COMPANY

115 LOOMIS ST., ROCKFORD, ILLINOIS

BARBER COLMAN

The man who needs a new machine tool and doesn't buy it is paying for it anyway...

in hidden tooling costs

THE difference between your costs and your competitors' may be hidden behind the production line. It's the cost of maintaining your tooling.

There's time lost for tool sharpening! Extra floor space for extra machines in the tool room! Skilled tool dressers! Chuck alignment and maintenance! Production lost for wheel dressing!

One answer to hidden tooling costs is Microhoning

Instead of bits to be sharpened and wheels to be dressed Microhoning uses self-aligning, self-dressing tools. Throughout their life Microhone abrasives make clean, uniform cuts.

Look behind the production line and you'll find that your hidden tooling expense may total more than the cost of the latest type of Microhoning equipment, which would assure you of increased output, uniform quality, consistent accuracy of dimension and a functional surface finish. In short, you are paying right now for the new machine tools you don't have.

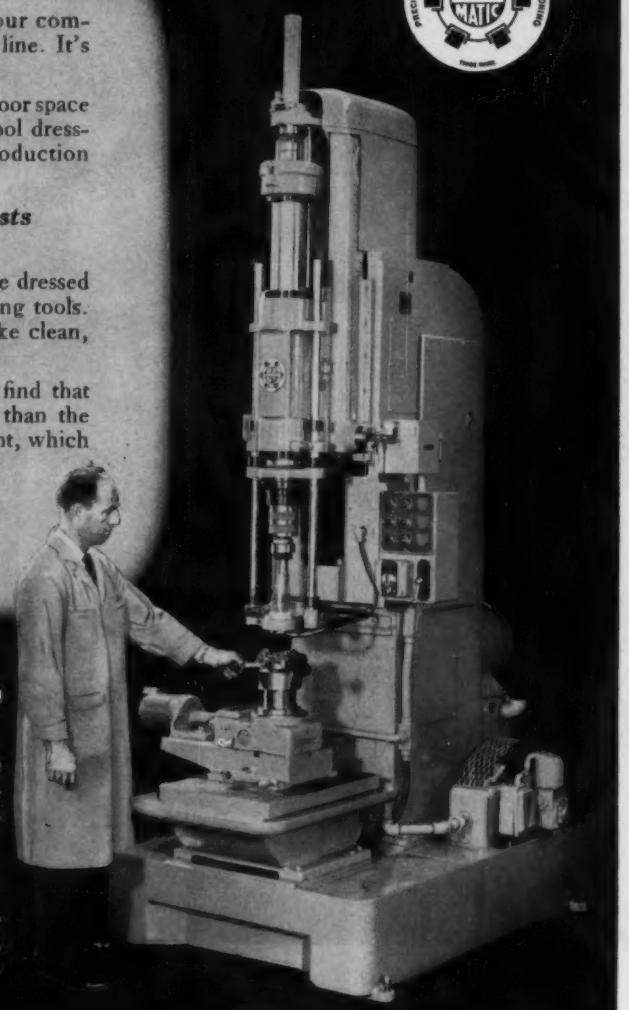
Surface: Spline in gear
Condition: Distorted by heat-treating

PROBLEM:

Excessive tooling cost — frequent changing and sharpening of tools — annealing of surface required — poor surface finish.

SOLUTION:

MICROHONING—Tool self sharpening—annealing not necessary—clean, consistent surface finish generated.



MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVE., DETROIT 38, MICHIGAN

MICROMATIC HONE CORP. MICRO-MOLD MFG. DIV. Boston Post Road Guilford, Connecticut

MICROMATIC HONE CORP. 2205 Lee Street Evanston, Illinois

MICROMATIC HONE CORP. 1535 Grande Vista Avenue Los Angeles 23, California

MICROMATIC HONE LTD. 330 Grand River Avenue Brantford, Ontario, Canada

MICROMATIC HONE CORP. MICRO-MOLD MFG. DIV. 231 So. Pendleton Avenue Pendleton, Indiana

REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Ave., Portland 4, Oregon • Mason Machine Tool Company, 415 So. Second East, Salt Lake City, Utah • Perine Machinery & Supply Co., 1921 First Ave. South, Seattle 4, Washington

REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

MICRO-PRECISION DIVISION • 2205 Lee Street, Evanston, Illinois

Hydraulic controls • Diesel fuel injection equipment

Seven years service for STANOIL *Industrial Oil at David Bradley Mfg. Works —No down time for lubrication*

L. R. Cummings (left), Standard lubrication specialist, inspects sample of STANOIL, with Robert C. Menken, Plant Engineer of David Bradley Manufacturing Works. Larry Cummings has been serving industrial customers for Standard Oil since graduation from Standard's Sales Engineering School. His mechanical engineering degree from Tri-State College of Indiana qualified him for this work. Customers of Larry's find this experience and background pay off for them.

David Bradley Tri-Trac, handy piece of farm equipment, gives farmer new opportunity for mechanization at low cost. Upper frame on which gasoline tank is mounted, is part formed in HPM press.

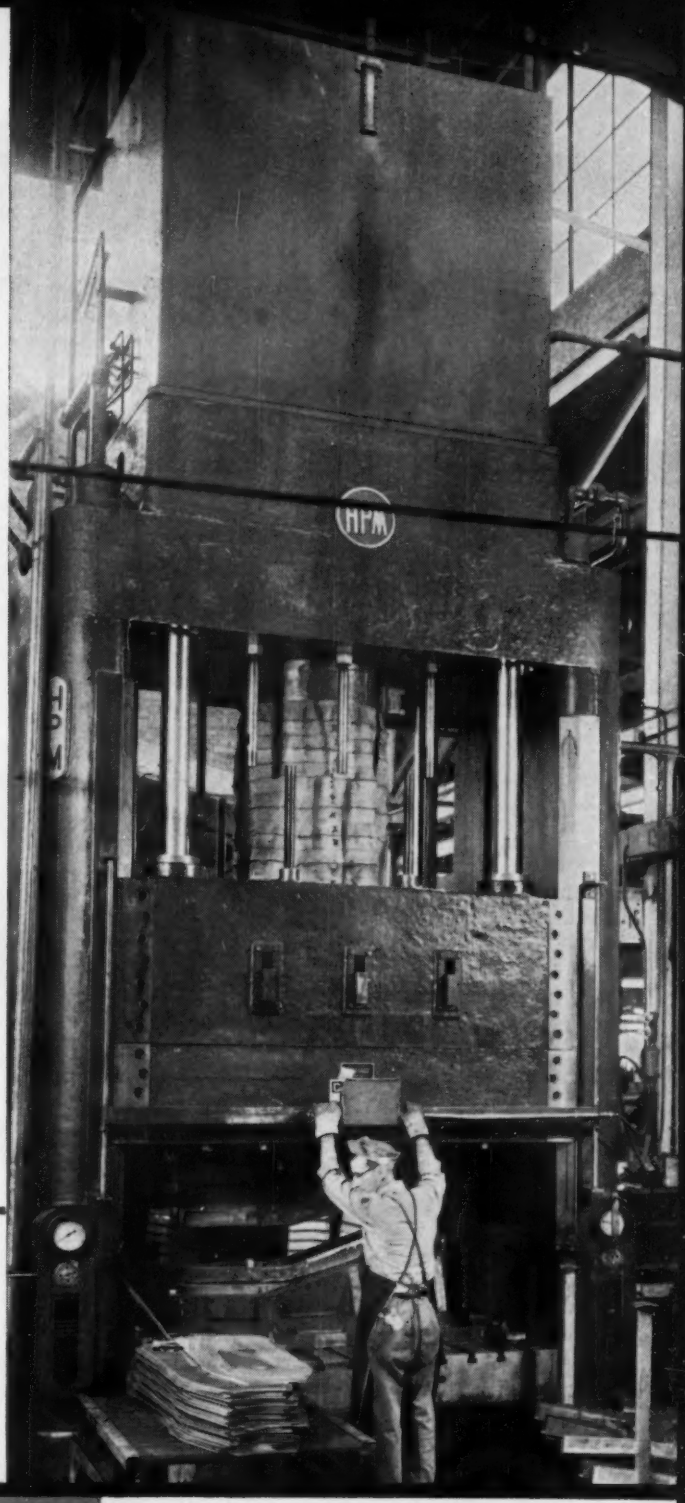
Seven years ago, David Bradley Mfg. Works installed 900 gallons of STANOIL Industrial Oil in an HPM press. There's been no down time required for lubrication maintenance since. A pump by-pass screen filter is the only filtering the oil receives, yet the system continues clean. In March, 1954, an analysis of the oil showed:

Viscosity @ 100°F.—980
Color, NPA — 6
Neutralization No.— .11

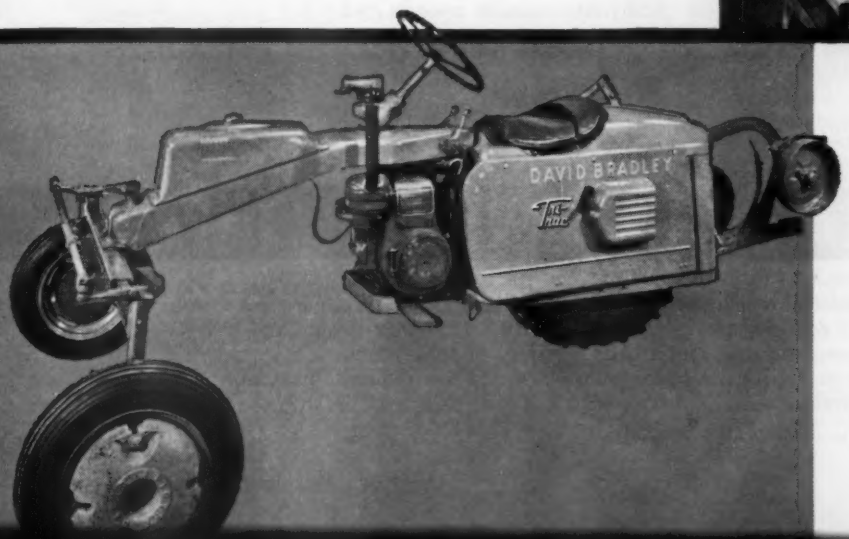
STANOIL Industrial Oil has long been at work for Bradley. Successful operations with it in other equipment caused Bradley engineers to specify STANOIL for this installation.

The HPM double acting, fast traverse hydraulic press reported on here is used to draw the upper frames for the David Bradley Tri-Trac, compact farm tractor. The Tri-Trac is the newest implement in the Bradley line. Bradley has been making farm implements since 1832.

Like to know more about STANOIL? Perhaps it can serve you as efficiently as it is serving David Bradley. Lubrication specialists in any Standard Oil office will be happy to help. In the midwest, a call to one of them will bring a prompt response. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



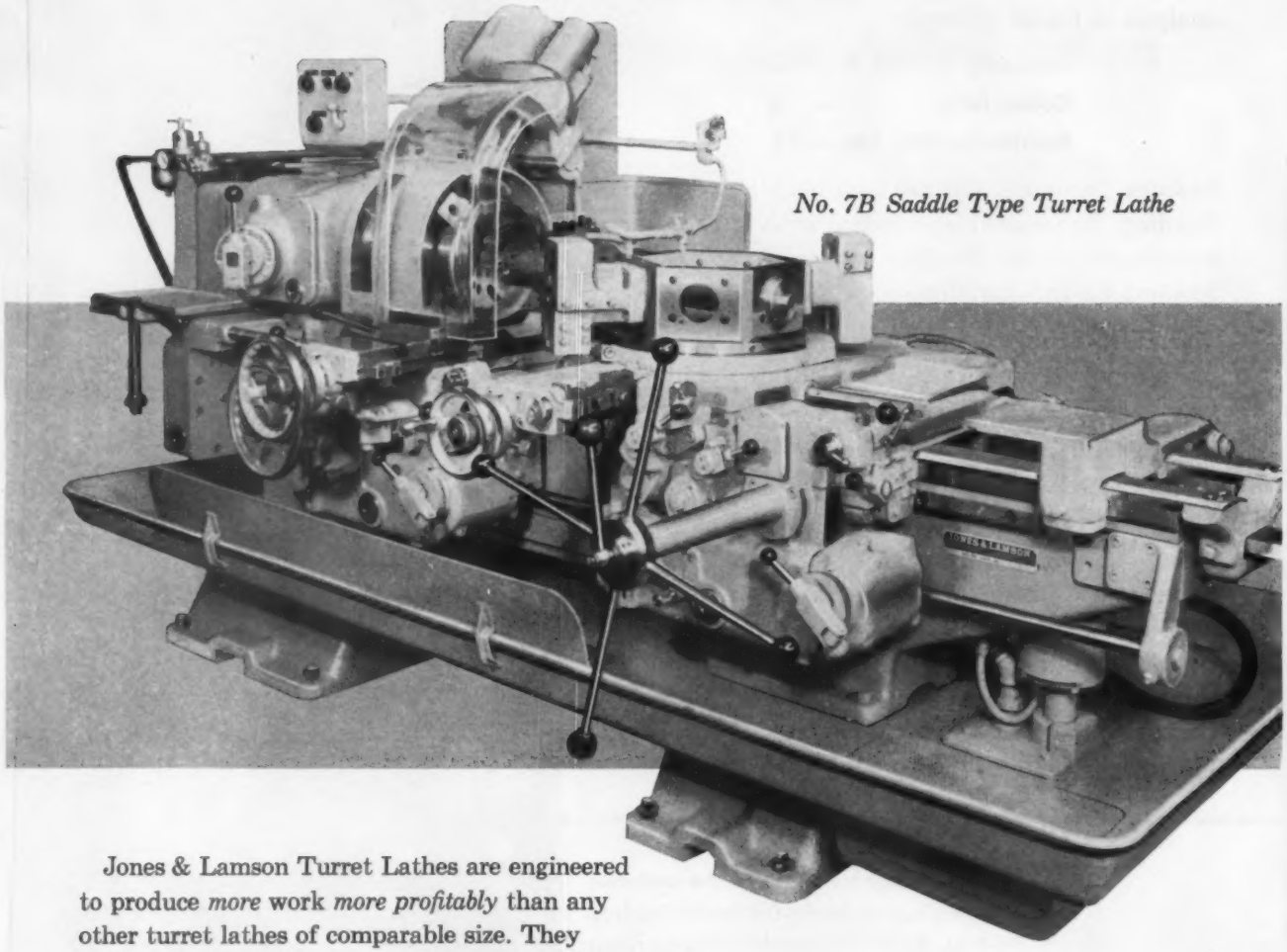
HPM 500-ton press on the upstroke after drawing upper frame for David Bradley Tri-Trac. Hydraulic system remains clean after 7 years service using STANOIL.



STANDARD

STANDARD OIL COMPANY
(Indiana)

Engineered for Precision... Powered for Production...



No. 7B Saddle Type Turret Lathe

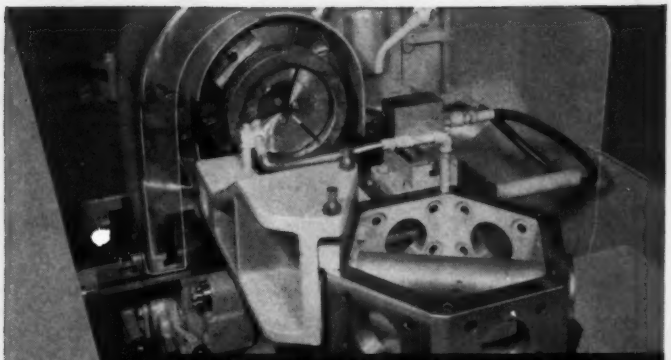
Jones & Lamson Turret Lathes are engineered to produce *more* work *more profitably* than any other turret lathes of comparable size. They have the rugged, rigid construction that makes possible greater accuracy and the use of Hi-Velocity turning; and they incorporate many superior features that assure PRODUCTIVE CAPACITY unmatched in its class. Adequate spindle speeds and horsepower insure the proper use of carbide cutting tools at surface speeds of 650-750 feet per minute.

J&L® JONES & LAMSON MACHINE COMPANY

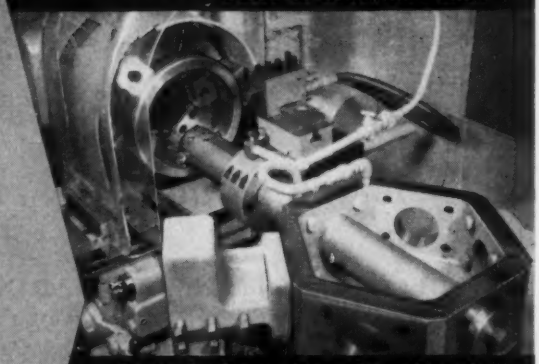
Jones & Lamson offers you a choice of methods for acquiring modern, profit-producing J & L equipment. In addition to outright purchase, J & L makes available several different "Pay-From-Productivity" plans at interest rates of 3¼% and lower (add-on), and a broad variety of lease plans.

Send today for complete details on J & L's machines, methods and Procurement Plans. Simply fill in the coupon, clip it to your letterhead and mail.

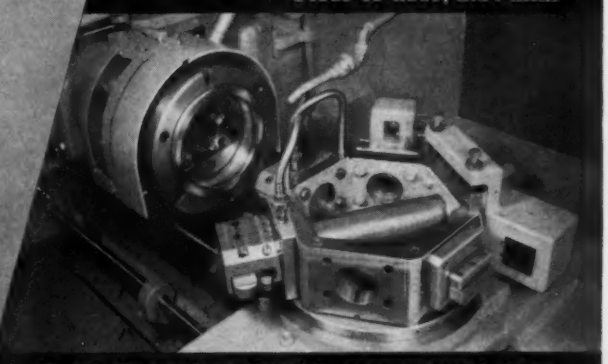
and capable of doing jobs like this...



First Operation: One tool mounted on the Hex Turret turns the O.D. while a tool mounted on the rear of the cross slide faces one end. At the end of the facing cut, the radius on the O.D. is formed.
Floor-to-floor, 1.94 min.



Second Operation: Location is taken from the two previous finished surfaces. Boring and I.D. chamfering are performed by using tools mounted on the Hex Turret while facing and forming of the O.D. are finished by tools mounted on the rear of the cross slide.
Floor-to-floor, 2.57 min.



Third Operation: Special wrap-around jaws mounted on a power operated three-jaw scroll chuck are used for holding the finish turned ring when grooving. The groove is formed by a radius tool held in a bar mounted on the Hex Turret (this applies to internal or external straight or taper races). I.D. is also chamfered in this operation.
Floor-to-floor, 1.67 min.

Machine tools do not pay dividends unless they are cutting metal. Engineering the tooling around the parts to be produced reduces the setup time to a minimum, and in many cases doubles the production per labor hour.

In this case high production methods of tooling for automatic lathes were simplified and applied to three 7B J&L Universal Saddle Type Turret Lathes. Inner and Outer Ball Bearing Races and Roller Bearing Races are produced on the same machines. Setup time from one lot to the next does not exceed fifteen to twenty minutes per machine.

MACHINE TOOL DIVISION

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES • AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS AUTOMATIC OPENING THREADING DIES & CHASERS

502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

Jones & Lamson Machine Company
502 Clinton St., Dept. 710, Springfield, Vt., U. S. A.

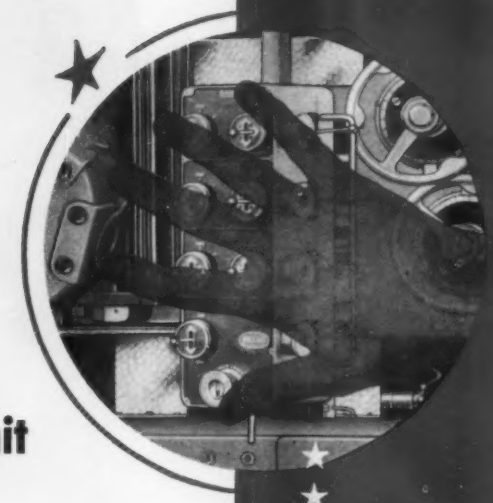
Please send me the J & L Machine Tool Replacement Information Kit.

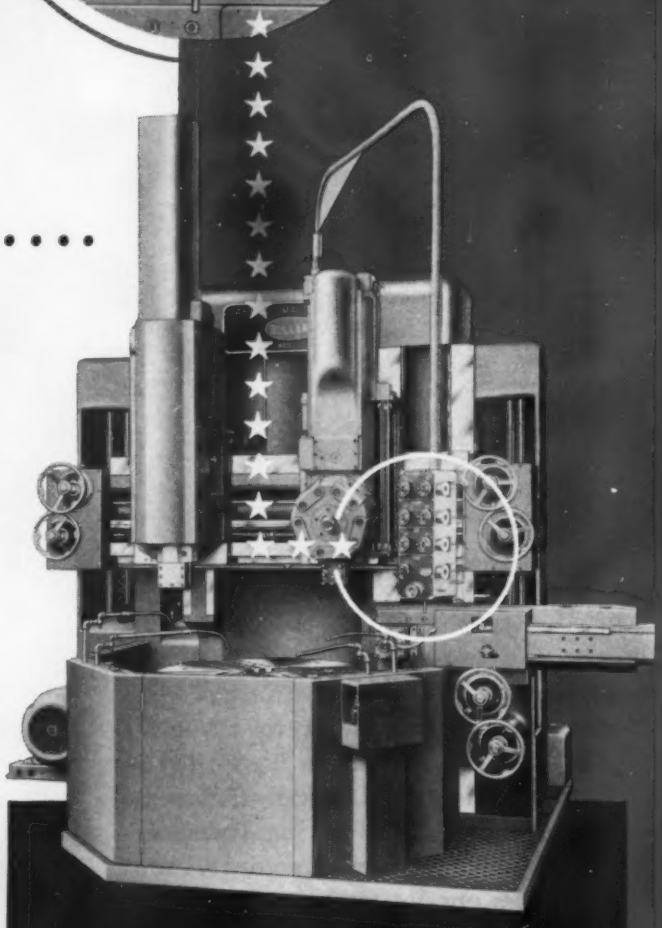
*Name*_____

*Title*_____

Within the Span of a Man's Hand

The power to transmit the commands of the operator *to the machine* . . . . . .





By means of the movable PENDANT CONTROL the start and stop of the spindle; selection of speeds, feeds and directional movements of all heads in feed or traverse are quickly and easily accomplished. Interlocks and a stopall stick provide safety for both operator and machine.

Additional features include:

SCREW FEED

for vertical and horizontal motion of all heads — to assure fine smooth finishes with greater accuracy.

POWER INDEXED MAIN TURRET (optional)

Five sided turret for "run of the mill" jobs. Four sided turret for production jobs.

PLAN TO VISIT OUR EXHIBIT AT BOOTH 1213 AT THE N.M.T.B.A. SHOW, CHICAGO . . . .

SEVENTY FIFTH BULLARD ANNIVERSARY

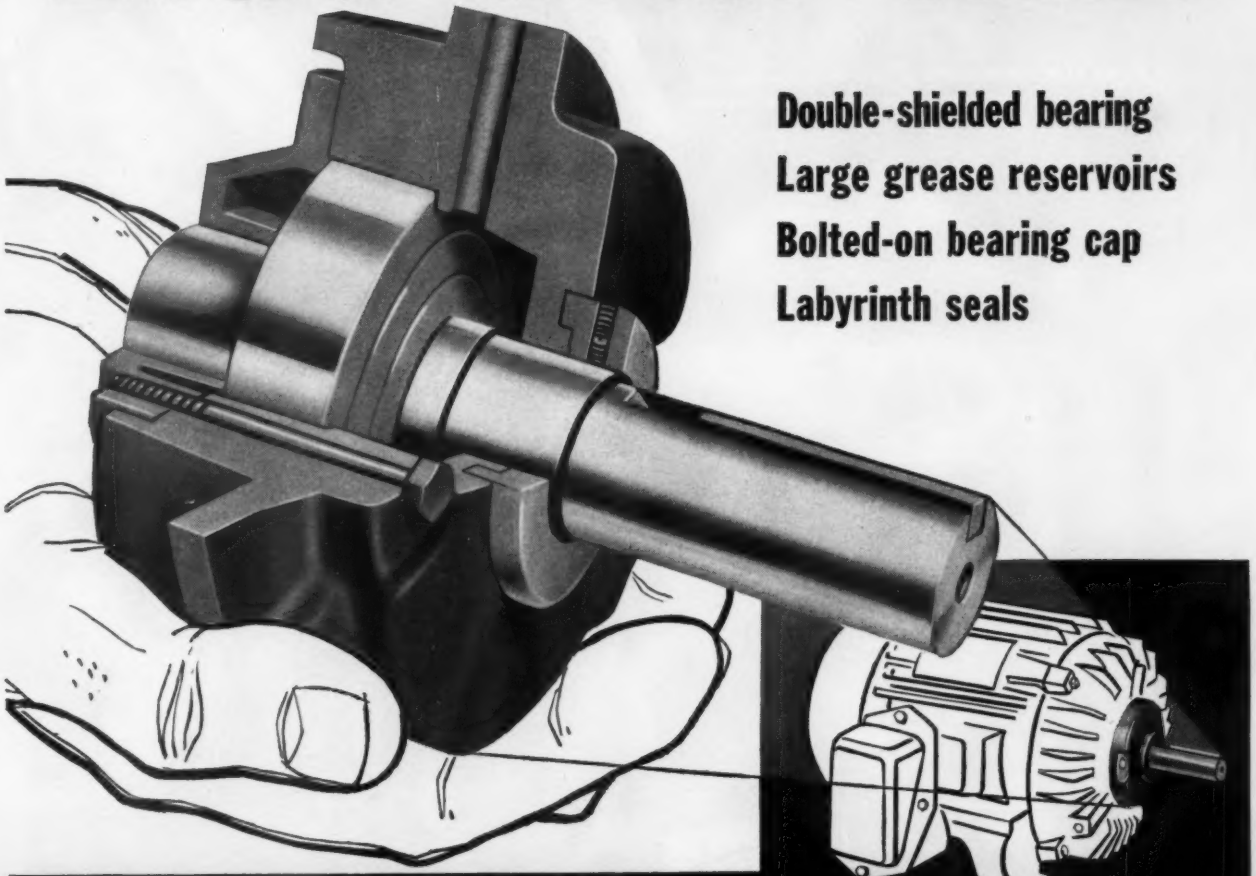
CUTMASTER VERTICAL TURRET LATHE Model 75

AVAILABLE IN 26, 36, 46, 56, 66 AND 76 INCH SIZES

THE BULLARD COMPANY

BRIDGEPORT 2, CONN.

Here Is Extra Motor Value



Double-shielded bearing
Large grease reservoirs
Bolted-on bearing cap
Labyrinth seals

This Allis-Chalmers Bearing Design Gives More for Your Motor Dollar

The bearing cap is held tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

You can lubricate these bearings without dismantling motor. Pipe-tapped holes in the bearing housings at two points provide means for inserting new grease, flushing out old grease and of relieving pressure during re-greasing.

Look for the extra bolts on the end housing . . . the sign of greater value. Ask your Allis-Chalmers representative or Authorized Distributor to show you a cutaway section of this maintenance-cutting design. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7225.

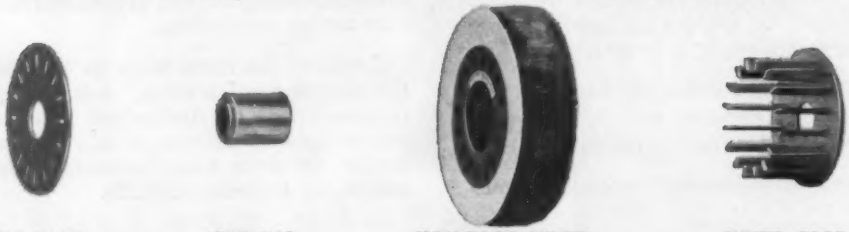
A-4616

ALLIS-CHALMERS

Behr-Manning pioneers an

The KON-TOOR WHEEL is ideal for automatic and semi-automatic straight line and rotary production.

AN EXPLODED VIEW OF WHEEL COMPONENTS . . .



SIDE PLATE | BUSHING | KON-TOOR WHEEL | WHEEL CAGE

The KON-TOOR WHEEL is constructed of numerous segments of double-faced abrasives and is available in face widths 2" to 7" inclusive – Flexible or stiff construction. Multiple wheels can be used for widths over 7".

For the newest in coated abrasives . . . watch BEHR-MANNING!

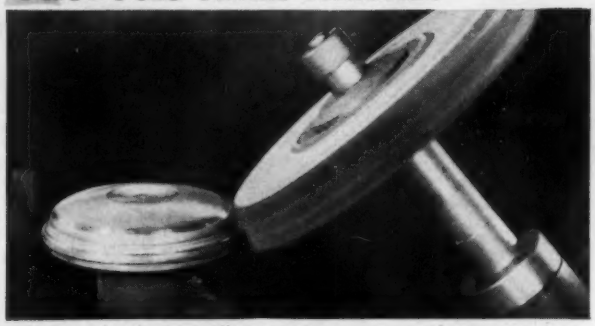
entirely new concept in polishing!

...the ALL coated abrasive KON-TOOR® WHEEL

CAN BE SHAPED TO CONTOUR

Note how the KON-TOOR WHEEL hugs the radius of this stainless steel cooking utensil.

PRODUCES FINER FINISHES

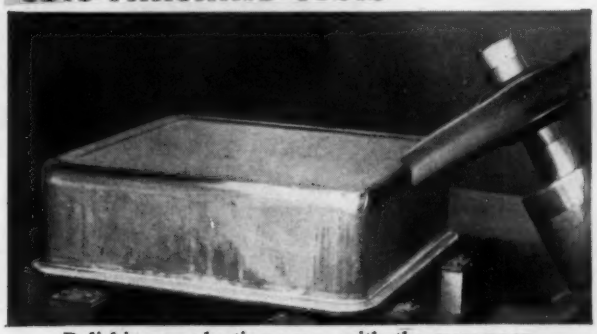


An intricate radius on a pressure cooker cover gets polished by a 2" face KON-TOOR WHEEL.

MINIMUM LUBRICATION REQUIRED

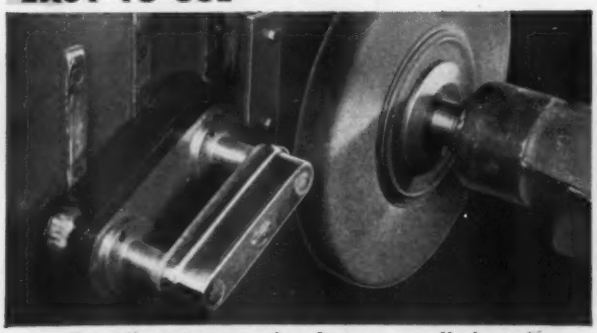
It cuts cooler all the way – A 2" face KON-TOOR WHEEL polishing a drawn steel coffee pot.

CUTS FINISHING COSTS



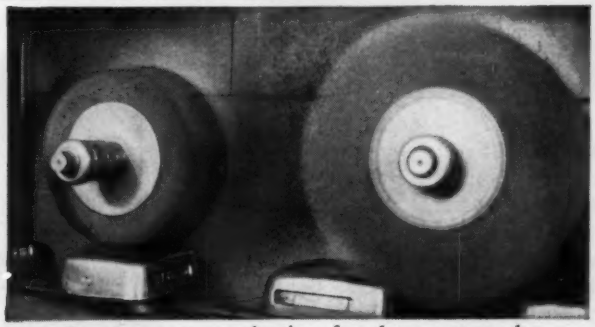
Polishing production soars with the KON-TOOR WHEEL on jobs like this aluminum stamping.

EASY TO USE



Complicated conversion factors are eliminated. The KON-TOOR WHEEL is easily adapted to standard lathes and work-holding fixtures.

IT'S WEARABLE TOO!!!



Stands up to production for days and weeks instead of hours – note wheel at left still producing after days on the job.

● For details, contact your local Behr-Manning Field Engineer, or write today to Behr-Manning, Troy, N.Y., Dept. AM-7.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

BEHR-MANNING® division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

GENERAL ELECTRIC ANNOUNCES . . .

NEW, Low-price Thy-mo-trol*

Printed Circuits—or "wireless" circuitry—constitute the "brains" of the new general purpose Thy-mo-trol Drives. Simply, it is a method of printing an electrical diagram on the back of a sturdy, lightweight plastic board. The electrical "track" or diagram is made of solder-covered copper strips.

All circuit components within the "brain" are connected without the use of wiring! A protective coating is sprayed over the entire printed circuit. All connections to the control circuits are of the simple "plug-in" type, making attachment and removal of connecting circuits a simple, hand operation.

"Brain" of new Thy-mo-trol Drive—printed control circuits. Top photo shows printed electrical diagram. G.E.'s industrial adaptation of this process helps reduce size and complexity of circuits. In lower photo, new at left, conventional at right.

Drive with Printed Control Circuits

NOW! GET RELIABLE, SMOOTH, ADJUSTABLE SPEED FOR MACHINE TOOLS IN A SIMPLIFIED, LOW-PRICED DESIGN

Designed for quality performance, reliable operation, easy maintenance, and at a new low price, a new and simplified line of general purpose Thy-mo-trol Drives has been developed by General Electric. These drives represent a new and far-reaching step in electronic adjustable speed.

An approximate 20% price reduction under the line it replaces is possible because G-E has successfully simplified the entire control system and has adapted printed control circuits into the Thy-mo-trol panels. New Thy-mo-trol design allows a substantial reduction in *weight, size, circuit complexity, wiring, maintenance costs and installation cost.* The new design is now available in two ratings: ¾ to 1 hp and 1½ to 3 hp—making your choice of an adjustable speed drive to meet specific needs that much easier.

Operating directly from a-c power, the new standard Thy-mo-trol Drive includes an electronic control panel, a d-c motor, and a push-button station. No anode transformer is necessary if operated on 440 volts, 50 or 60 cycle, single phase power. Separately mounted auto-transformers are supplied as a standard feature for voltages other than 440.

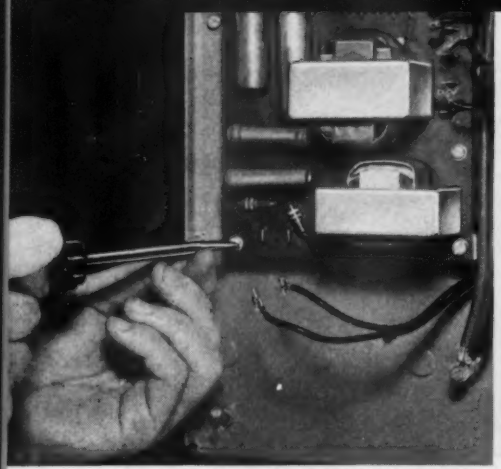
The new drive is rated at constant torque over the entire speed range. Speed range is 8 to 1 for continuous duty with higher ranges possible for special applications. Optional modifications include jogging, reversing, tachometer feedback, reactor loop control, and external current limit adjustment.

For more information on this outstanding new adjustable speed drive, contact your nearest G-E Apparatus Sales Office or write for Bulletin GEA-6234, General Electric Company, Section 791-1, Schenectady 5, New York.

Progress Is Our Most Important Product

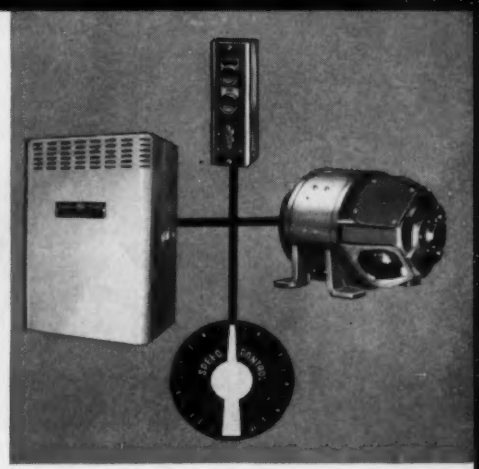
GENERAL ELECTRIC

*Registered Trade-mark of General Electric Company



Easily attached or removed. Only a screwdriver is needed. Plugs and terminals are numbered for easier service.

Simplified repair. Component replacement is fast and easy—a simple bench operation. No need to discard entire unit.



Three basic units. DC motor, pushbutton station, and panel containing tubes and "brain" make up new Thy-mo-trol Drive.

now you can save valuable

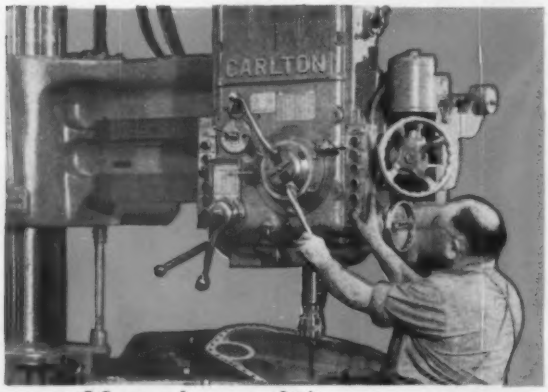
one operation ahead . . . with

Carlton

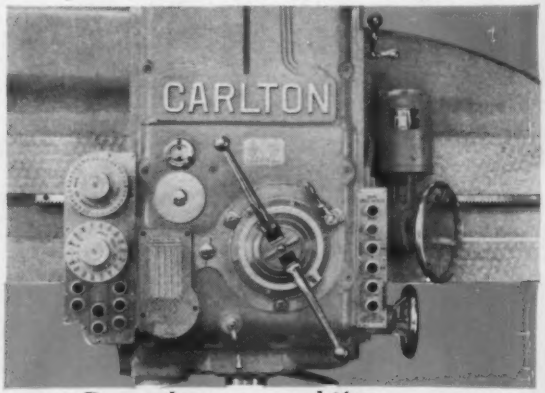
The new Carlton-Leber speed-feed pre-selector system speeds up drilling by permitting operator to set speed and feed for the next operation while the machine is still under cut. With this productive new device, the time lost heretofore in setting speeds and feeds is now used for almost continuous drilling. Now you stop the spindle only for changing cutting tools.

Pre-selector Here's how it works: while the machine is cutting on one operation, the operator sets speed and feed dials for the next operation. When present operation is complete, he stops the

Carlton Radial Drills now come with your choice of 3 different



1 ***Manual gear shift:*** 2 shifter levers for controlling speeds, 2 shifter levers for controlling feeds.



2 ***Pre-select gear shift:*** 1 speed graduated dial and 1 feed graduated dial pre-set speeds and feeds.

drilling time by giving operator a chance to set

the new

pre-selector

spindle, changes the drill, and starts spindle again. At that instant, the gears automatically shift to the correct speed and feed.

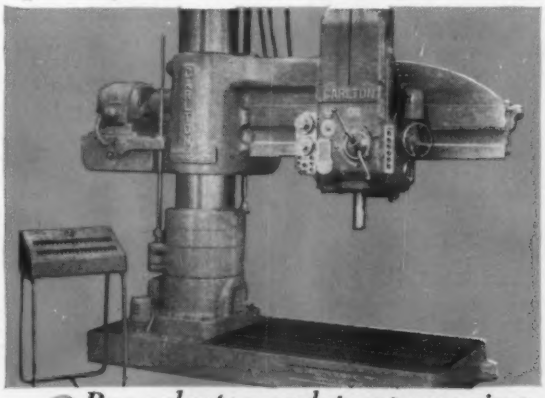
Additional time is saved by instantaneous gear shifting made possible by mechanically oscillating the change gears which assures quiet gear mesh.

Programming Another Carlton-Leber system—the programming unit—can be used in connection with the pre-selector. The programming system pre-selects speeds and feeds for an entire drilling program including as many as 20 or 30 operations.

With the introduction of the Carlton-Leber pre-selector and programming systems, you can now buy Carlton radial drills with your choice of three different types of speed-feed control as illustrated below.

Be sure to see the new Carlton-Leber pre-selector and programming devices in action at the Machine Tool Show in Carlton booth 919. In the meantime, write for your descriptive bulletin. The Carlton Machine Tool Co., Cincinnati 25, Ohio, U.S.A.

speed-feed controls . . .



3 ***Pre-selector and programming gear shift*** sets up correct speeds and feeds for a complete sequence of operations.

Carlton

horizontal and radial drills

You're invited . . . to see the new Carlton-Leber pre-selector and programming devices. Visit us in booth 919 at the Show.

you can drive to the poorhouse

This is not intended as a joke: the machine tool that was ▸ *paid for* long since may today produce an annual loss equal to its cost of replacement. We know, because Avey equipment has helped many companies to stop losing money on antiques, and make money so fast that the investment was paid for in a year or year and a half. Why?

Because Avey production drilling machines are essentially simple, compact, straightforward in design, built in standard units that fit together to fit your job, and function with standard work-holding fixtures. When a production run is finished, the units are often rearranged for another job, at a fraction of the cost of the original setup, and the owner gets an even bigger bonus of earnings.

Are you really convinced that your drilling operations are now running at top efficiency? Send us your part prints and if we can't be convinced, too, *you stand to gain.* ◂

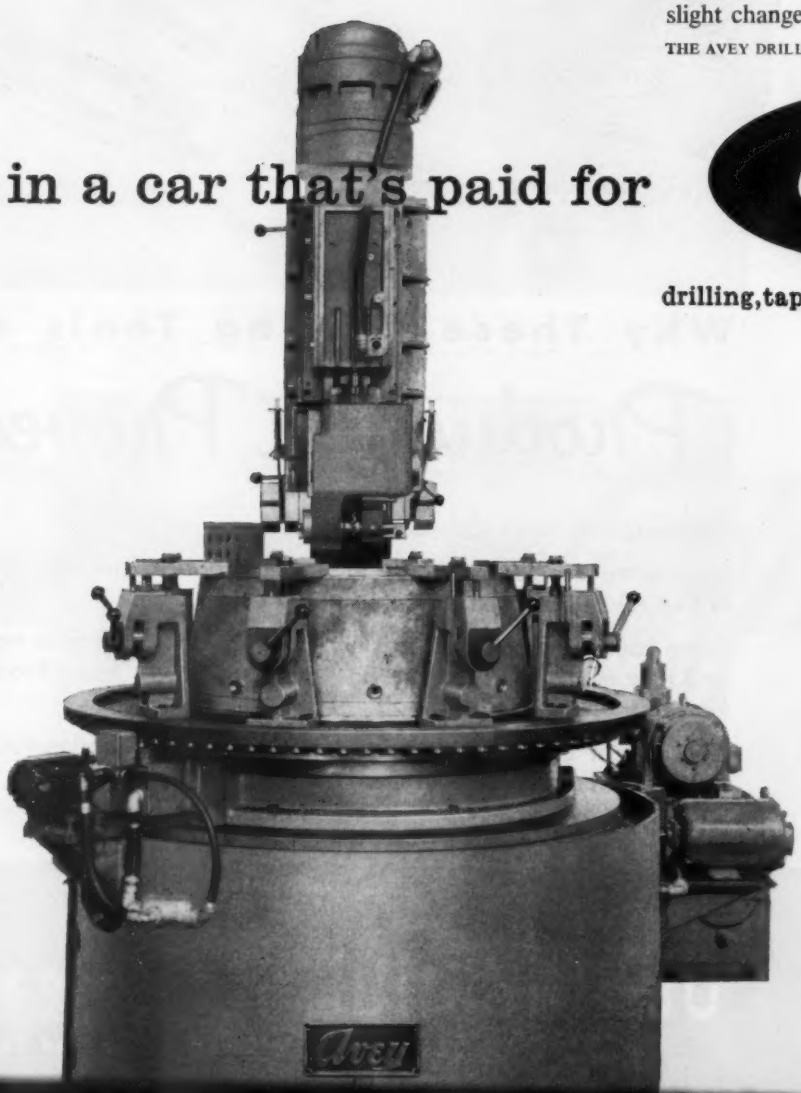
This Avey machine mills 88 slots in a stainless steel jet engine part—a slot every 40 seconds. Vertically mounted automatic cam feed unit produces desired cycle time. Cutter head can't operate unless automatic indexing table is in correct position. Our advanced Electrodex table makes it easy to change fixture and part quickly with only slight change in indexing mechanism.

THE AVEY DRILLING MACHINE CO., CINCINNATI 1, OHIO

... in a car that's paid for

Avey

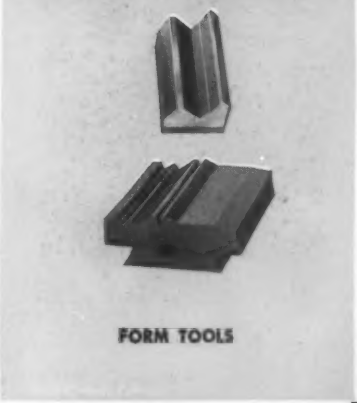
drilling, tapping, production machines



GROUND MULTIPLE THREAD MILLING CUTTERS

FORM RELIEVED MILLING CUTTERS

SINGLE POINT TOOLS



FORM TOOLS

BROACHES

FACE MILLS

CONTINENTAL DRIVE TOOLS

Why These Cutting Tools are

Production Proved

Continental is an Ex-Cell-O subsidiary.

As such, we are constantly trying out new tool designs, new methods, in Ex-Cell-O's big parts production shops.

There could be no finer "proving ground" for testing new materials and new methods. There are no finer cutting tools than "Production-Proved" tools by Continental.

Call in your Ex-Cell-O representative or contact Continental in Detroit for information about them.

CTW

SEE EX-CELL-O AT THE MACHINE TOOL SHOW

55-17

Continental TOOL WORKS

Division of Ex-Cell-O Corporation, Detroit 32, Mich.

Mill circles and angles in one set-up with

tri-D MILLING HEAD

KEARNEY & TRECKER MILWAUKEE

Pat. No. 2286821
Other Pat. Pend.

Booth No. 508

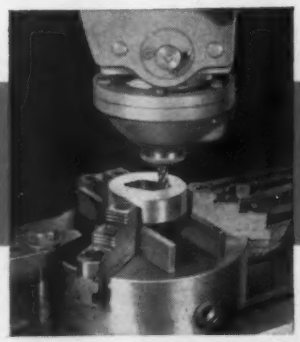
Here, operator uses TRI-D Milling Head to perform a variety of intricate milling operations on a workpiece—straight, circular, angular, radii—all in a single set-up. Angular adjustment of cutter in vertical plane is an exclusive feature of TRI-D.

For tool rooms, die shops or production milling — — do it faster, easier with new TRI-D attachment

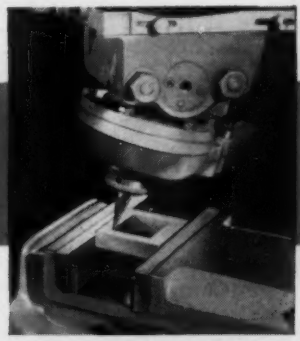
Kearney & Trecker's new TRI-D Milling Head — featuring rotary, lateral and angular adjustment in vertical plane — is ideally suited for rough and finish milling of various geometric shapes — straight lines, radii, circles, angles — all in a single set-up. It can be easily mounted on almost all horizontal and some vertical milling machines . . . *regardless of make.*

Illustrated here are some of the intricate operations the TRI-D performs.

Learn what the TRI-D can do for you — how different it is from all other types of milling heads in use today. For "proof-positive" demonstration, see your Kearney & Trecker representative. Contact him today, or write Kearney & Trecker Corporation, 6784 W. National Ave., Milwaukee 14, Wis.



Die (left) and punch (right) are rough and finish milled in a single set-up, using all three basic movements of the TRI-D and milling machine. Prescribed feeds and adjustment of TRI-D is all that's required to finish both workpieces.



Angular setting of TRI-D, with an ordinary end-mill ground to a specific angle, is used to mill the "square corners."

Kearney & Trecker CORPORATION MILWAUKEE 14, WISCONSIN

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

For more information on Kearney & Trecker's new TRI-D Milling Head, write for catalog No. TD-10.

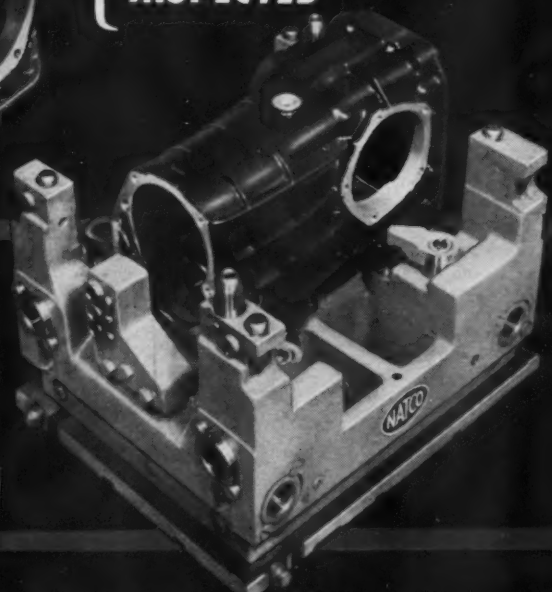
Builders of Precision and Production Machine Tools Since 1898

MORE TRANSMISSION CASES AT LESS COST.....

55 PARTS per HOUR

201 OPERATIONS ON EACH PART

DRILLED, BORED, REAMED, TAPPED, SPOTFACED, CROSS-FACED, MILLED, CHAMFERED and INSPECTED



Parts are loaded into individual holding units which are conveyed through the machine automatically. After machining is completed, chips are removed and the holding units pass through a washer and are returned to the first station.

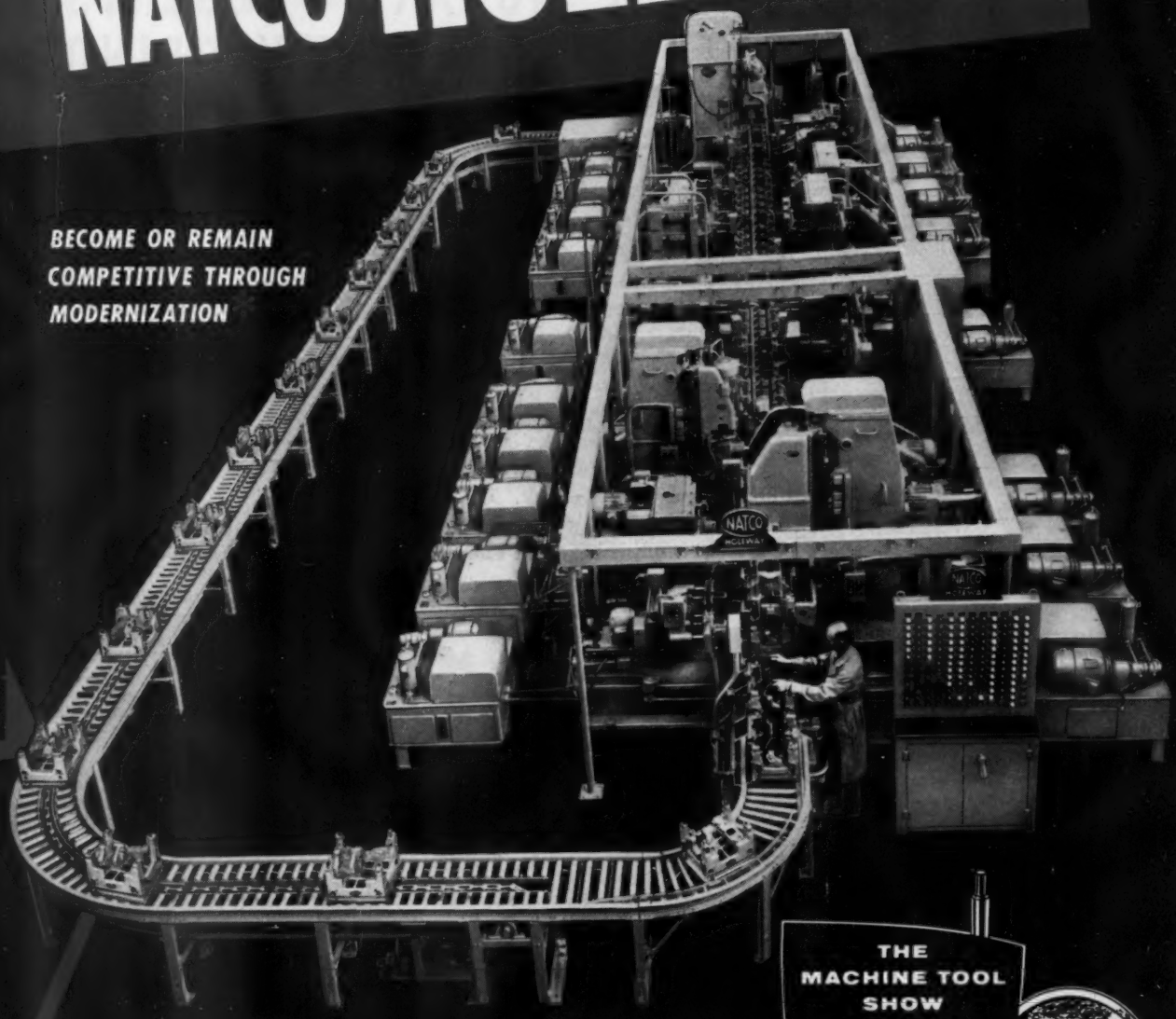
for answers to your Drilling, Boring, Facing and Tapping problems

Call a Natco Field Engineer

CHICAGO, *Room 203, 6429 W. North Ave., Oak Park*
DETROIT, *10138 W. McNichols Rd.*
BUFFALO, *1807 Elmwood Ave.*
NEW YORK, *35 Beechwood Ave., Mount Vernon*

..... WITH A NEW NATCO HOLEWAY

BECOME OR REMAIN COMPETITIVE THROUGH MODERNIZATION



THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATRE

...Competitize with NATCO production!

NATIONAL AUTOMATIC TOOL COMPANY, INC.

RICHMOND, INDIANA

NATCO

PREVIEW ITS SPEED, ACCURACY AND VERSATILITY AT THE SHOW!

CAST IRON END PLATES

30 pieces (60 surfaces) per hour; ⅛" stock removed each side; limits ± .002"

ADJUSTING SCREW WASHERS

Low carbon steel; 200 pieces (200 surfaces) per hour; .025" stock removed; limits ± .001"

HOT ROLLED STEEL CAMS

225 pieces (450 surfaces) per hour; 1/32" stock removed each side; limits ± .001"

NOW! BLANCHARD PRESENTS ANOTHER GREAT NEW GRINDER

with Automatic Cycle Control

When you're at the show, watch this great new Blanchard Surface Grinder perform a variety of jobs with speed, ease and accuracy.

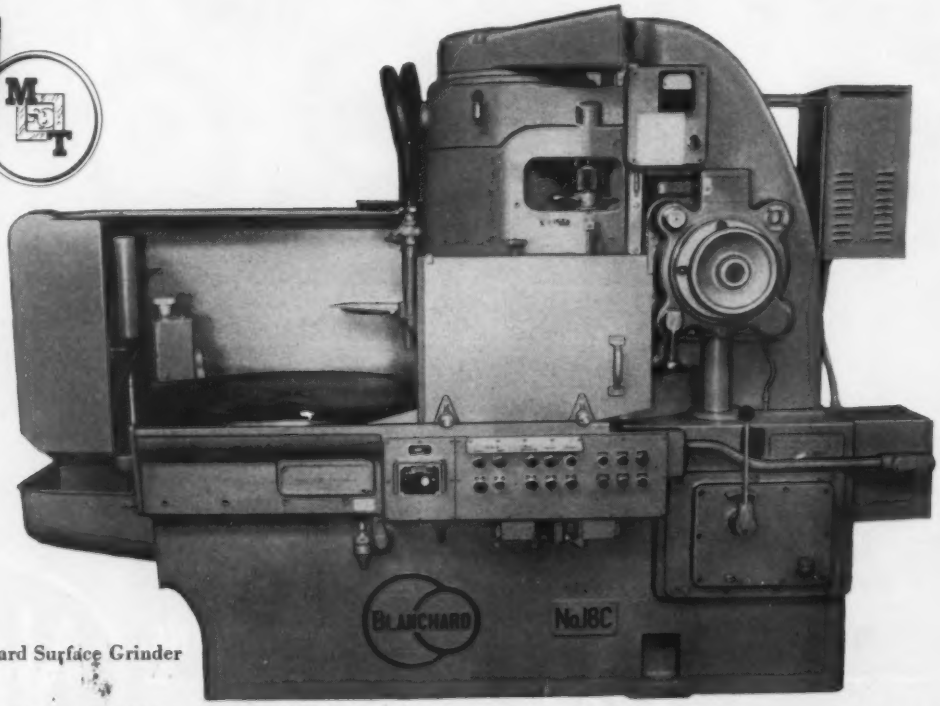
One operator can easily operate two of these No. 18-C grinders under balanced conditions. By using the automatic cycle, he can unload, clean and reload one grinder while the other is grinding.

Here's what the automatic cycle does: moves chuck (30" or 36" dia.) to grinding position and starts it rotating; starts wheel rotation and coolant pump; provides rapid wheel approach to work; engages power down-feed at preset rate; changes to fine feed just before finished size is reached; stops feed when work is to size – "sparks" out; raises wheel head; stops wheel, coolant pump and chuck; moves chuck to loading position – demagnetizes chuck.

This new Blanchard also features: push button selection of manual or cycle operation; size control; simplified feed and head traverse controls; adjustable dwell timer.

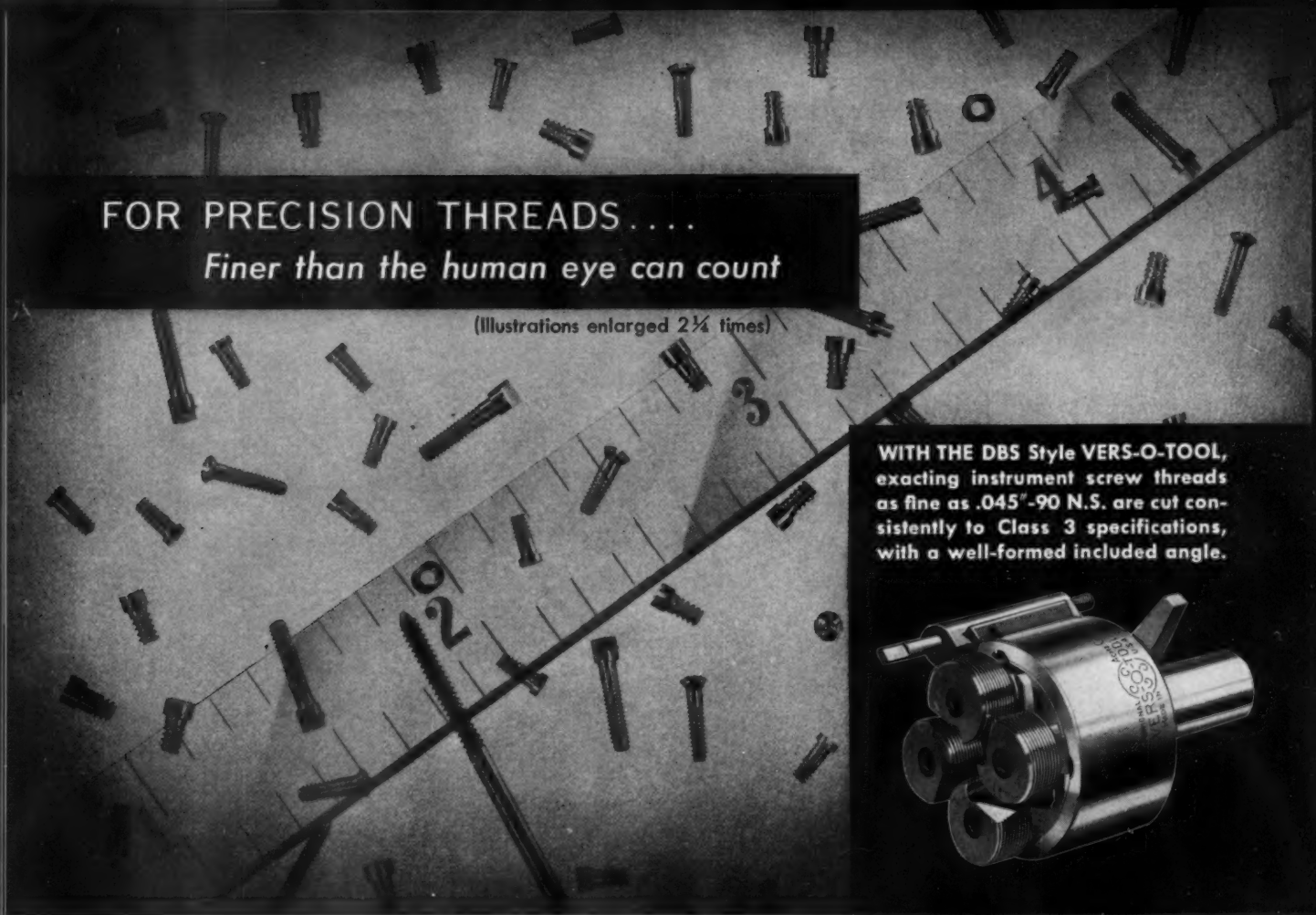
THE MACHINE TOOL SHOW
CHICAGO, ILL.

BOOTH 406



No. 18-C Blanchard Surface Grinder

THE BLANCHARD MACHINE COMPANY 64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



FOR PRECISION THREADS....

Finer than the human eye can count

(Illustrations enlarged 2¼ times)

WITH THE DBS Style VERS-O-TOOL, exacting instrument screw threads as fine as .045"-90 N.S. are cut consistently to Class 3 specifications, with a well-formed included angle.

This standard VERS-O-TOOL head cuts 'em by the thousands—exactly to specifications

Each threading job, whether it's tiny precision instrument parts, or huge oil field pipe lines, has its own special requirements. Maybe it's machinability, thread form or size . . . or it may be tolerances or fussy finishes.

In supplying and servicing National Acme Vers-o-tool heads for thousands of such threading jobs, our engineers have become familiar with all those requirements.

And it's a pretty good bet that in so doing, they have accumulated the experience which will give you the most accurate threads, with the least trouble—and at the lowest cost per piece.

You name the job. Vers-o-tool has the cost-cutting answer.

SEND FOR BULLETIN DT-52. Or, better yet, ask for our recommendations.

IF YOU CUT THREADS, TURN, OR FORM FROM THE END — Namco VERS-O-TOOL System gives you greater cost-reducing flexibility.

It's this simple —

- *Take a standard Vers-o-tool (the self-opening die head—you don't have to back it off the threads).*
- *For threading, use National Acme ground thread chasers (for greatest economy use the circular type for long runs; the adjustable blade type for short runs).*
- *Convert to any other end turning or forming operation by changing only the cutters and blocks.*
- *Use Namco micrometer gage to check and set chasers or cutters during resharpening. No time-wasting trial cuts required.*
- *Standard Vers-o-tools are made in revolving Style DR and non-revolving Style DS for diameters .056" to 6½"; Style DBS for BSA and Brown & Sharpe automatics.*

See us at The Machine Tool Show. September 6 to 17. Booth Numbers 324 and 705

OUR JOB: to provide the *Right Machine* for **YOUR JOB**

Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Switches • Solenoids • Contract Manufacturing.

THE NATIONAL ACME COMPANY

171 EAST 131st STREET • CLEVELAND 8, OHIO

right in tune

...and REX is the standard by which all other high speed steels are compared

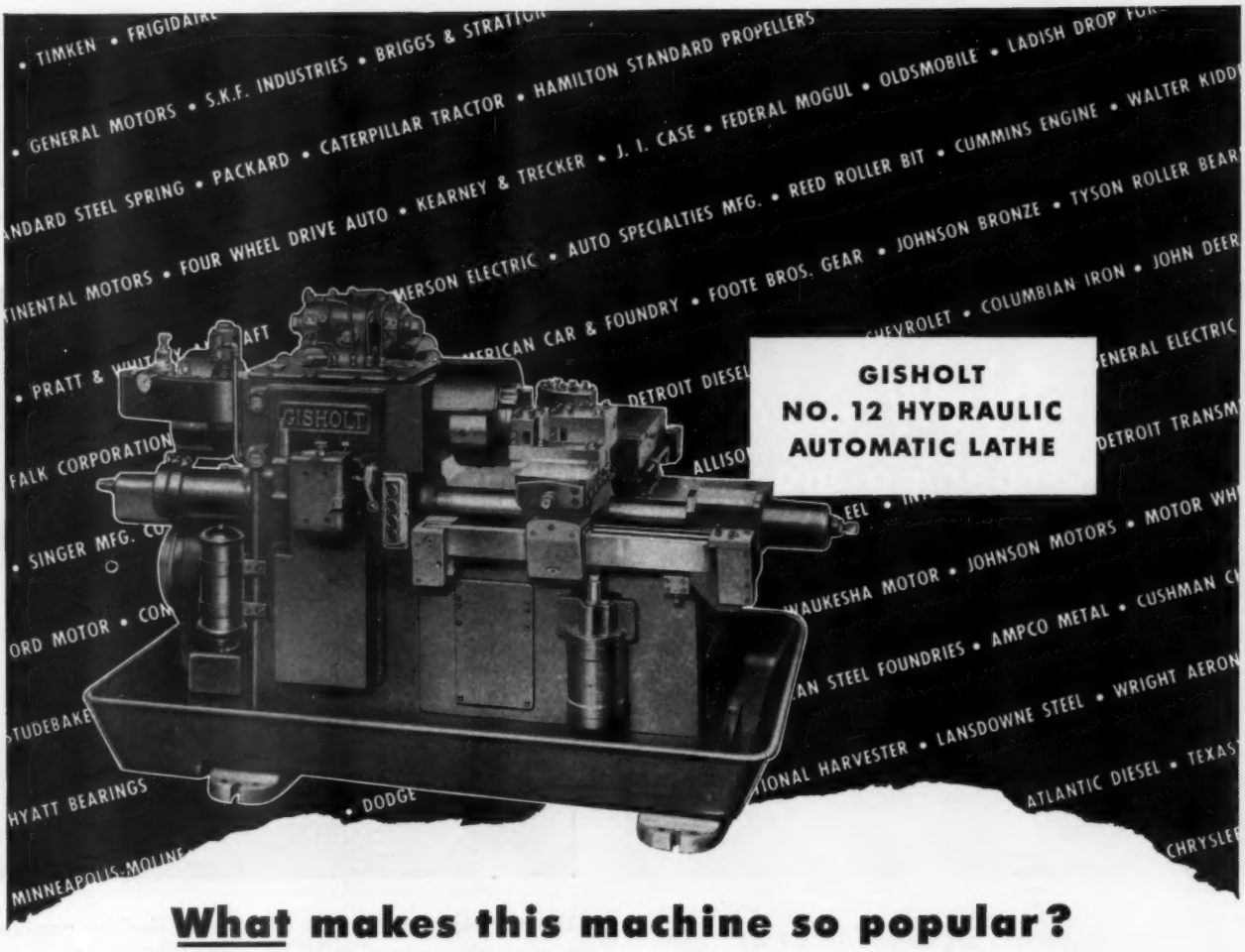
A tuning fork sounds the *standard pitch* to which musical instruments are compared. There's a recognized standard for high speed steels, too — Crucible REX®.

But don't take our word for it. Try REX in your own shop. Compare its structure, finish, hardenability, carbide distribution and general uniformity. Measure the *extra performance* you get. You'll see for yourself why no other tool steel outperforms REX . . . why it's the *standard for comparison* wherever high speed steels are used.

Next time you buy tool steels, be sure of top performance — specify REX. Remember, it's made only by Crucible — and is available from local warehouse stocks, or by prompt mill delivery. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America


GISHOLT
NO. 12 HYDRAULIC
AUTOMATIC LATHE
• GENERAL MOTORS • S.K.F. INDUSTRIES • BRIGGS & STRATTON
• PACKARD • CATERPILLAR TRACTOR • HAMILTON STANDARD PROPELLERS
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• AUTO SPECIALTIES MFG. • REED ROLLER BIT • CUMMINS ENGINE • WALTER
• FOOTE BROS. GEAR • JOHNSON BRONZE • TYSON ROLLER
• COLUMBIAN IRON • JOHN
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HYATT BEARINGS
MINNEAPOLIS-MOLINE
CHRYSLER

What makes this machine so popular?

It's the simple basic application of hydraulic principles—perfected through the years. It's a single spindle machine that handles all classes of work—holding with a chuck or an arbor, with fixtures, or with a work driver for between centers. Front carriage alone will perform 14 different cycles. Independent rear slide can be positioned at any angle to the work. Feeds are infinitely adjustable...not limited by cams. Here's the versatility, the speed, the automatic cycle, and the easy change-over that mean big savings for scores of users. Why not for you?

If you have parts up to 12″ to produce at lower cost, look at the Gisholt No. 12 Hydraulic Automatic Lathe. Call your Gisholt representative. Or write us.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

This new catalog will show you why.

All operating features are clearly described, fully illustrated. Here, too, are 28 different jobs to show many classes of work and tooling possibilities. Write for your copy.

Gisholt Machine Company
Madison 10, Wisconsin

Please send my copy of the catalog describing the Gisholt No. 12 Hydraulic Automatic Lathe.

Name.....*Title*.....

Company.....

Address.....

City.....*State*.....

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

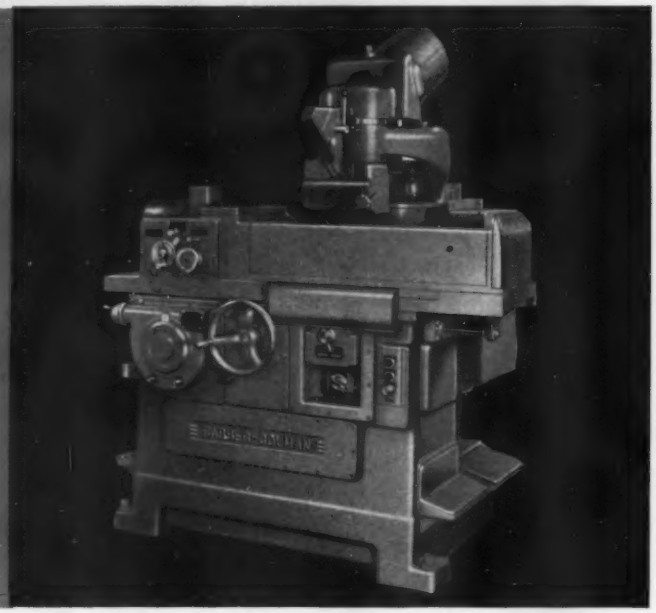
keep tool maintenance on a production basis with

automatic

NEW no. 6-5 sharpening machine

A PRODUCTION MACHINE
FOR PRECISION SHARPENING

- wet grinding for carbides
- adjustable stroke and table speed
- precision built-in wheel dresser
- automatic feed and index counting



The new No. 6-5 Hydraulic Sharpening Machine provides a production method for precision sharpening of hobs and form — relieved cutters. This is a precision machine which accurately controls spacing, rake angle, lead of flute and surface finish.

Wet grinding, which is provided as standard equipment on the No. 6-5, is essential for grinding carbide — tipped tools and also permits greater feed when sharpening high-speed steel tools. Setting up new jobs for completely automatic sharpening is accomplished rapidly and conveniently. The adjustable table stroke and variable table speed also contribute to the production efficiency of this machine.

For a demonstration of how to keep cutting tool maintenance on a production basis, see this machine in operation at the Machine Tool Show.

THE MACHINE TOOL SHOW
CHICAGO, ILL.

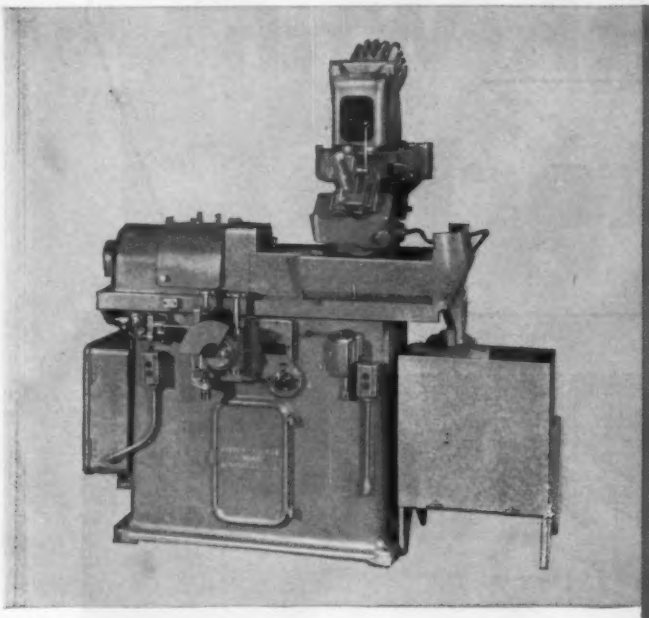
Visit us in Booth No. **1322**

Barber-Colman Sharpening Adaptable to All Hobs and Form-Relieved Cutters

Sharpening is one element of hob accuracy which must be maintained in order to cut correct gears. For high production sharpening or for small, job-lot sharpening, the most economical and most accurate method of sharpening hobs and form-relieved cutters is the Barber-Colman method. In addition to the No. 6-5, two other sharpening machines, the No. 4-4 and the No. 10-12, are built to cover a complete size range of work. Any hob or form-relieved cutter can be sharpened on one of these machines.

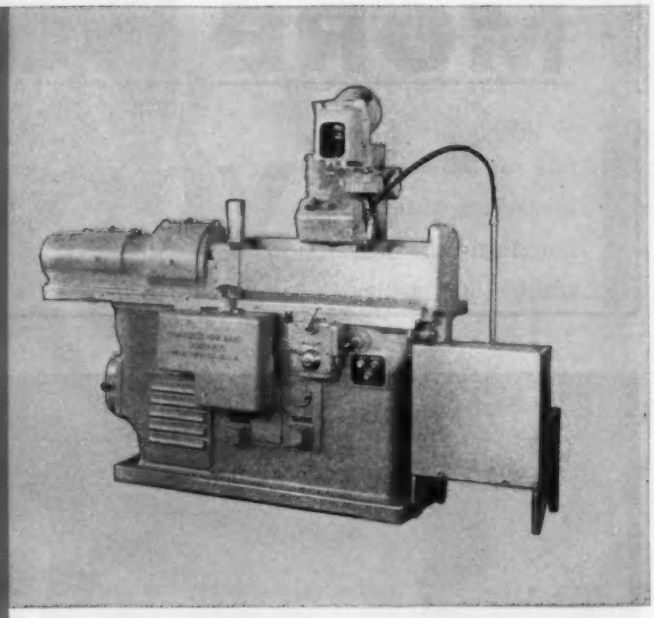
BUILDERS OF PRECISION GEAR

hob sharpening



No. 4-4 Sharpening Machine

This is an automatic sharpening machine with fixed stroke, and built-in wheel dresser for work up to 4" diameter and 4" long. Wet grinding (shown) is optional as extra equipment. Positive mechanical control over all sharpening factors automatically produces uniformity and reduces sharpening time. Spacing, lead of flute and radialism are held within tolerances for any accuracy classification, including Class AA.



No. 10-12 Sharpening Machine

This is an automatic sharpening machine with adjustable hydraulic stroke for work up to 10" diameter by 12" long. Wet grinding (shown) is optional as extra equipment and the machine has a precision built-in wheel dresser as standard equipment. Tolerances are easily held for any specific class of accuracy. Once the necessary set-up is made, sharpening proceeds automatically without further attention from the operator.

All Barber-Colman hobs and form-relieved cutters are sharpened on one of these three machines. Because of their accuracy and ease of operation, most competitive hob manufacturers also use them for sharpening hobs.

A Barber-Colman Sharpening Machine will do your sharpening cheaper, faster and more accurately than can be done by any other method. Come in and see us during the Machine Tool Show to determine how you can simplify your sharpening problems by adopting this modern precision method.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

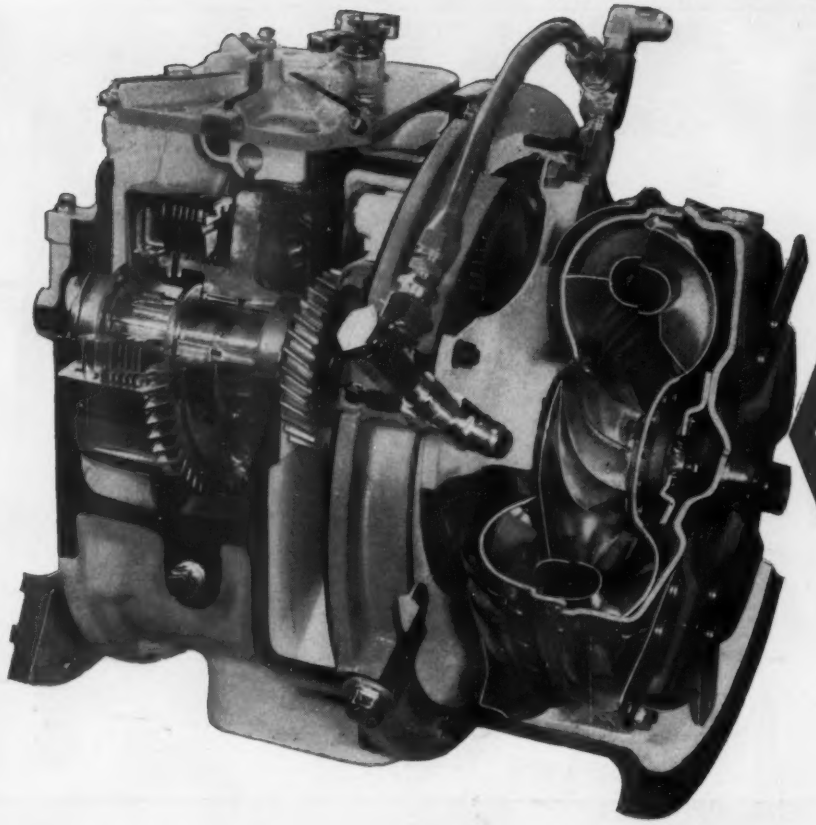
Barber-Colman Company

GENERAL OFFICES AND PLANT, 617 ROCK STREET, ROCKFORD, ILL.

HOBS AND MACHINES SINCE 1911

Here's WHY You'll Get MORE WORK With Hydratork

Clark Hydratork Carloader loads Mufflers, 234 at a clip—Maremount Automotive Products, Chicago



CLARK'S NEW HYDRATORK DRIVE

Powerful, compact . . . *designed* to give you more work. Split-housing provides complete accessibility to all operating components. Engineered for the constant stop-and-start operation of a fork truck . . . clutchless Hydratork Drive is the most advanced transmission on the market.

Clark's Hydratork Carloader sets NEW standards for the industry!

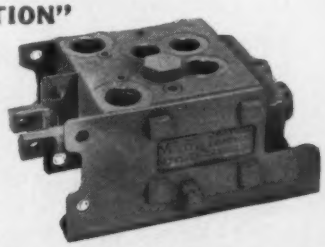
MORE POWERFUL ENGINE
Big, new engine gives you faster acceleration, faster travel speeds, power reserve for extra work loads.

BETTER GRADABILITY
The most efficient operating powertrain on the market today, provides power when you need it to climb the steepest grades.

FASTER LIFTING SPEEDS
Fast, powerful response—lifting speed when loaded has been increased to 37 feet per minute.

PRECISE LOAD CONTROL
New tilt and lift valves give positive load control . . . load jump and load shock are eliminated.

NEW "FEATHER ACTION" VALVE Metering action regulates flow of fluid through lifting valve, giving balanced pressure, eliminating load shock throughout entire hydraulic system, truck and load. Sure, positive lifting action . . . less stoppages . . . more work!



NEW TILT LOCK VALVE
Equalizes pressures on both ends of tilt cylinders, eliminating "load jump" caused by vacuum built up on one end of cylinder. Here is positive holding action . . . additional safety . . . more work!

It's The Most Modern Lift Truck Yet! No clutch—no gears to shift gives you better maneuverability, less driver fatigue—MORE WORK! Power multiplication through torque conversion gives you extra power, smooth acceleration—MORE WORK! No clutch means easier driving, less down-time—MORE WORK! Any way you look at it . . . you'll get more work with Clark's Hydratork Carloader. Ask your local Clark dealer for details.

CLARK® EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 3, Michigan

RUGGED PRESSES

DESIGNED BY BLISS

FOR THE AGE OF AUTOMATION

Bliss "packaged presses," built to JIC standards, offer advantages like these

- All piping and wiring for press controls, automatic work-handling devices and maintenance tool power outlets are *built into the uprights.*
- Cuts installation time and costs—practically all the installation crew has to do with the press is "plug it in".
- Eliminates split responsibility for press performance—centers it instead on the press builder.
- Simplifies installation and maintenance of dopers, cushions, lifters, Iron Hands and other work-handling devices.
- Leaves clean, uncluttered exterior—cranes can move up close to load or unload dies without bumping or snagging.

FOR MORE INFORMATION, WRITE

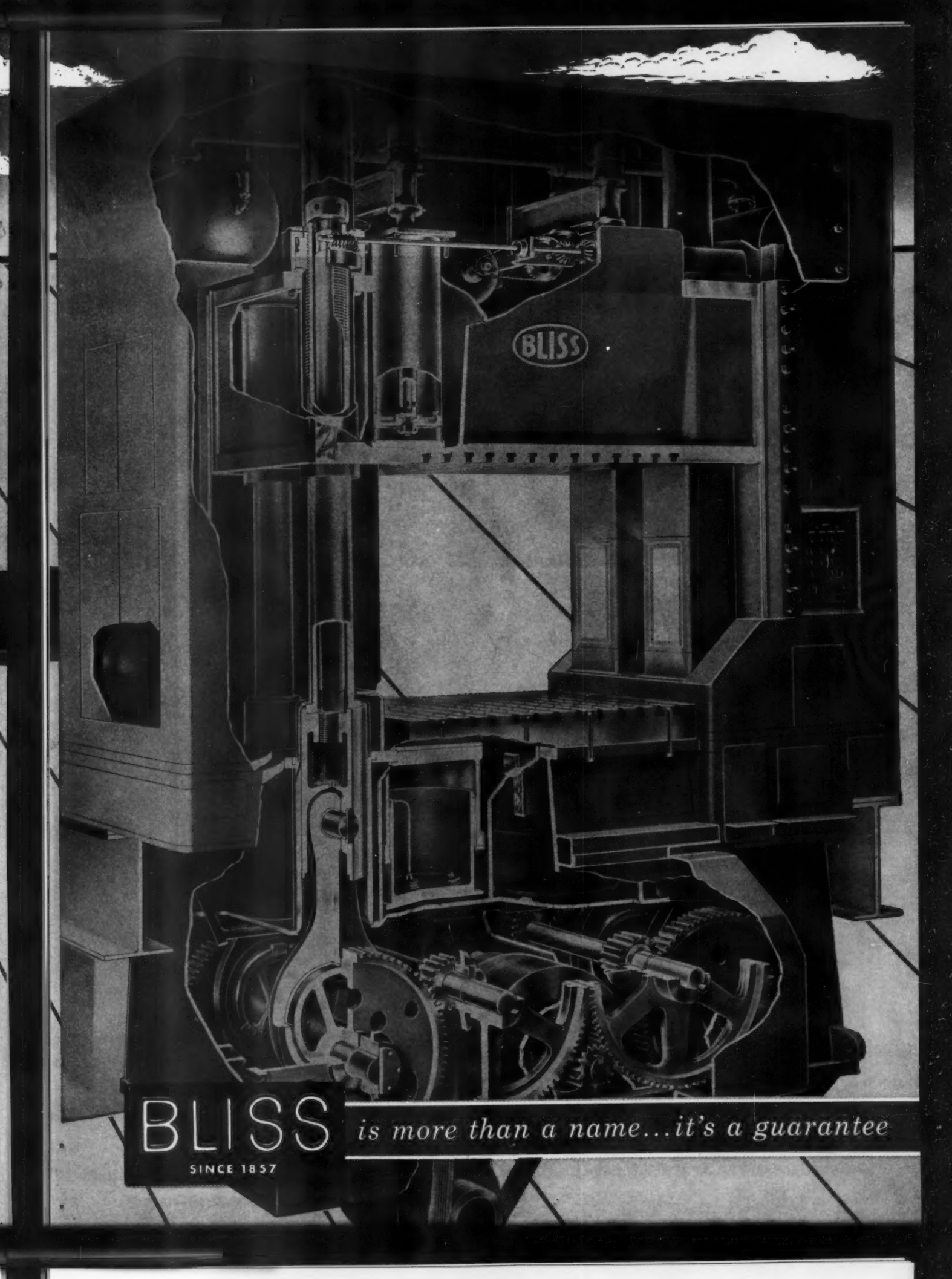
E. W. BLISS COMPANY, Canton, Ohio

Presses, Rolling Mills, Special Machinery

U. S. Plants in Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Pittsburgh and Midland, Pa.; San Jose, Calif.

Beneath the sleek exteriors are these new design features—

- Heavy frame construction—For a century, Bliss has been known for its emphasis on heavy frames. With big presses like these, Bliss' heavy sections and internal ribbing easily take quick shock loads in stride.
- Extra-long gibbing—slide works entirely within gibs, even when adjustment is down. Motorized slide adjustment is self-braking, assures accurate positioning. Slide runs true at all times, meaning longer die life and greater accuracy.
- Integral gear and eccentric drive—its compactness allows gears to operate within the crown. No overhanging gear guards. And Bliss' design eliminates torsional deflection of main pin, minimizes distortions due to overloads.
- New automatic lubricating system—a recirculating type which has proved foolproof in service. Positive piston displacement method automatically lubricates every bearing surface at predetermined intervals. Electrical interlocks shut down press if a single feeder fails.
- Cool-running high speed clutch—Bliss' combination pneumatic friction clutch and brake is extremely fast—only a fraction of an inch needed between full engagement and brake. Self-aligning feature automatically compensates for wear. Clutch is also self-cooling.

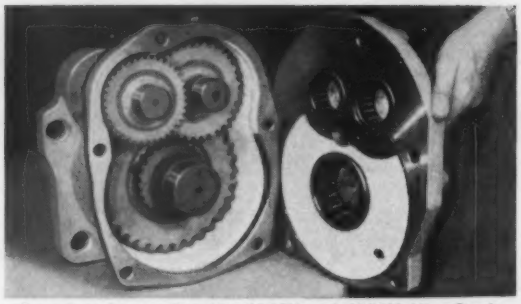


BLISS

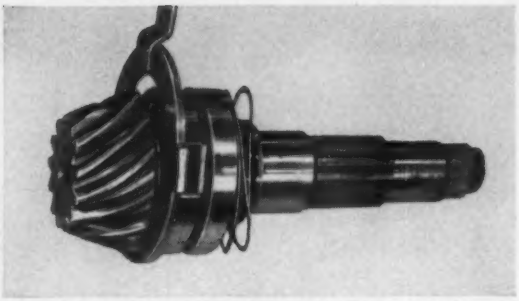
SINCE 1857

is more than a name...it's a guarantee

How you can put hundreds of

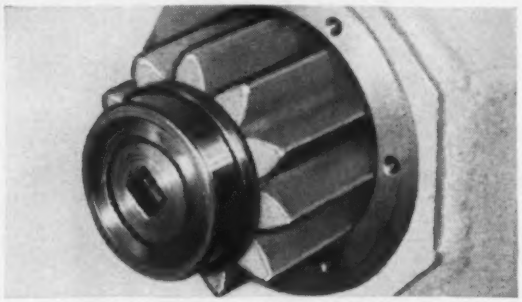


Gear Box Gears—Republic 4320H and 4820H Alloy Steels



Transfer Case Pinion—Republic 4820H Alloy Steel

Transfer Case Ring Gear—Republic 4820H Alloy Steel



Final Drive Pinion—Republic 4820H Alloy Steel

horsepower to work with safety

LeTourneau-Westinghouse does it with the help of Republic Alloy Steels on the Model B Tournapull. This high-speed, self-propelled scraper is designed to carry 23 yards of earth at speeds up to 28 miles per hour.

Republic Alloy Steels are used in this giant for final drive pinions, transfer case ring gear and pinion, gear reduction box gears and pinions, and electric motor pinions.

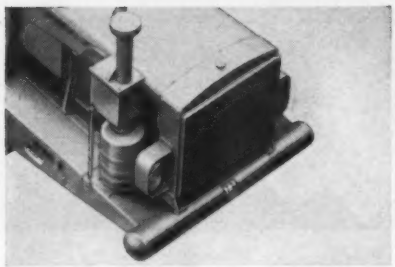
Alloy steels provide an outstanding combination of qualities essential to safety in designing equipment to carry heavier loads at higher speeds. In these fine steels you will find highest strength values—plus an unusually high strength-to-weight ratio that permits transmission of hundreds of horsepower through tough, strong gears and shafts free from excessive weight.

And when you add to these qualities uniform hardness, that means reduced wear—plus resistance to fatigue, shock, stress and temperature extremes—you have a material with the ability to insure safety, extend equipment life, and to cut maintenance and replacement costs.

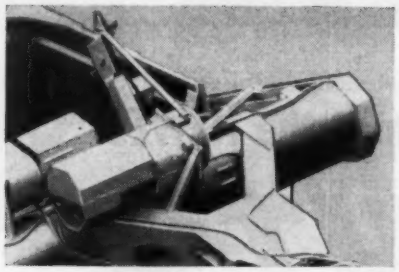
Republic—world's largest producer of alloy steels—is ready to assist you with metallurgical and engineering assistance in the most efficient and economical application of these fine steels to your product. The coupon will bring you more information.

REPUBLIC STEEL

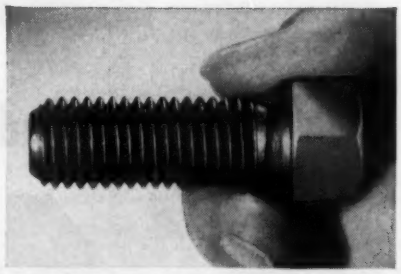
World's Widest Range of Standard Steels and Steel Products



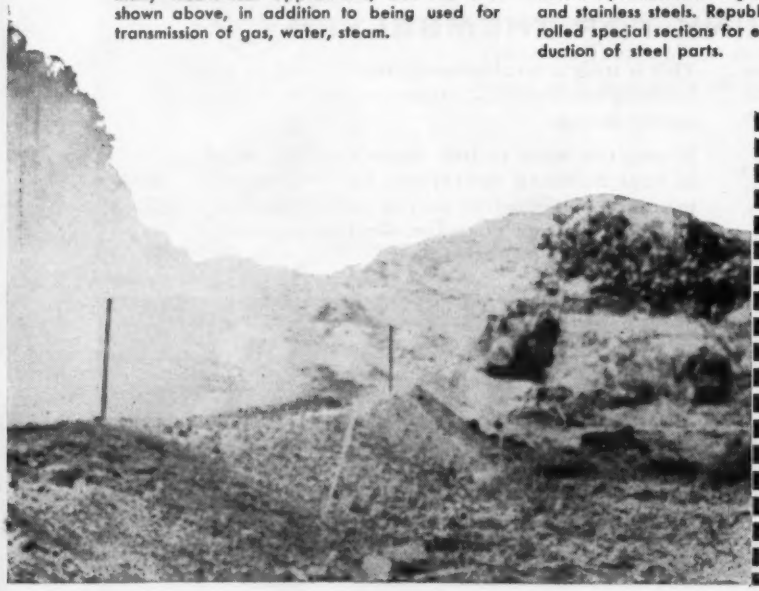
ANOTHER REPUBLIC PRODUCT, Electric Resistance Weld Steel Pipe, is used for the front bumper on the Model B Tournapull. Both this type and Continuous Butt Weld Steel Pipe have been serving industry for years in all types of applications. Today they are better than ever. They have many mechanical applications, like the one shown above, in addition to being used for transmission of gas, water, steam.



PINS, BRACES AND REINFORCEMENTS on the Model B Tournapull are made from Republic Hot Rolled Carbon Bars. Countless forging and general manufacturing companies look to Republic as a dependable source for hot rolled steel bars. Rounds, squares, hexagons, octagons and flats are produced in all grades of carbon, alloy and stainless steels. Republic also supplies hot rolled special sections for economical mass production of steel parts.



REPUBLIC COLD FINISHED CARBON BARS are used by LeTourneau-Westinghouse for cap screws and bolts. Cold drawing gives steel parts higher strength, greater uniformity and a bright, smooth finish. Republic's Union Drawn Division supplies high-quality cold finished bars in all standard and special carbon, alloy and stainless analyses. And to get the most out of these steels, Republic offers you the services of expert metallurgists and machining specialists.



REPUBLIC STEEL CORPORATION
3102 East 45th Street
Cleveland 27, Ohio

REPUBLIC STEEL

Please send more information on:

☐ Alloy Steels ☐ Steel Pipe

☐ Cold Finished Bars ☐ Hot Rolled Bars

Name_____ Title_____

Company_____

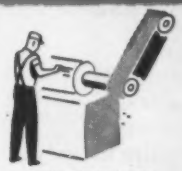
Address_____

City_____ Zone____ State_____

K-6667

Down

MANUAL

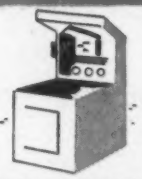


SEMI-AUTOMATIC

the years

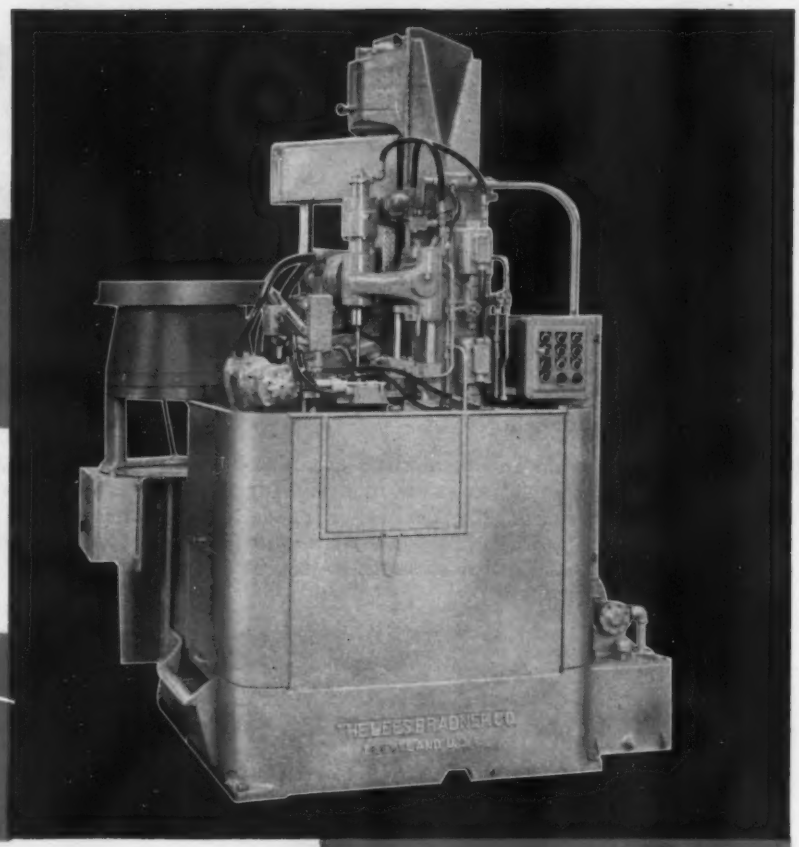
with

AUTOMATIC



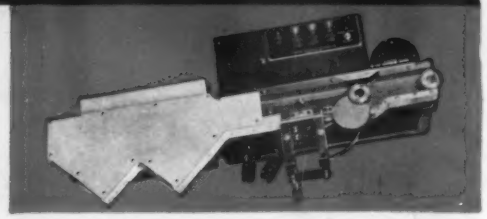
SELF LOADING & UNLOADING

machine



tools

...and now the NEWEST



AUTOMOTION®

MACHINES THAT THINK FOR THEMSELVES

Moving ever forward in the development of new gear-hobbing methods, Lees-Bradner now presents a hobber that *electronically* corrects tolerances while the machine is in action.

The secret lies in an "electronic brain" that checks the finished gears as they come from the hobber and makes corrections as necessary in pitch diameters or root fillets by electrically shifting the hob between cycles.

This is truly a revolutionary step forward in gear hobbing efficiency . . . time-saving as well as money saving.

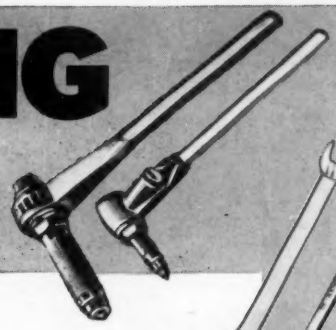
If you, too, want to stop manufacturing "scrap" in your hobbing operations by catching off-tolerance pieces *before* they're hobbed, get the whole story from your Lees-Bradner representative. Or, write to us direct.

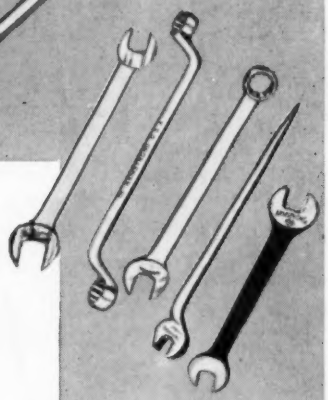
the LEES-BRADNER Company

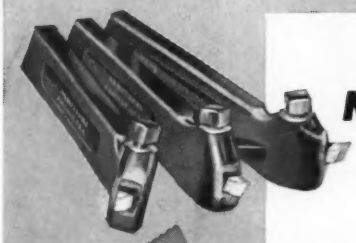
CLEVELAND 11, OHIO • U.S.A.

ARMSTRONG

Quality TOOLS





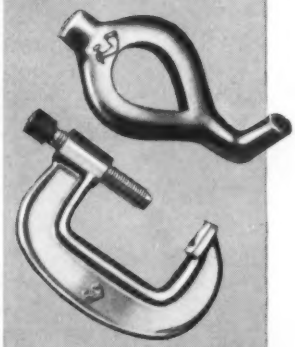


More than meets the eye

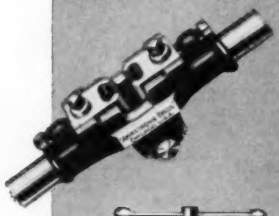
There are extra values in ARMSTRONG TOOLS that become apparent only with use.

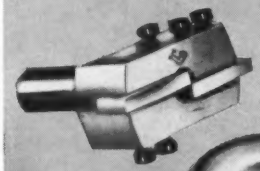
TOOL SENSE— convenience in use — the most efficient *"tool approach"* built into ARMSTRONG Tool Holders; the balance and *"feel"* of an ARMSTRONG Wrench; the *rigidity* of ARMSTRONG "C" Clamps; the extra *toughness* of ARMSTRONG Lathe Dogs and Eye Bolts; the universal *adaptability* of ARMSTRONG Set-up and Hold-down Tools — the evidence of "tool sense", the understanding of each tool's requirements.

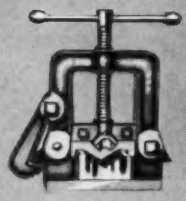
STRENGTH — built into each individual ARMSTRONG TOOL is a safety factor of extra *strength* — *strength* beyond any need, the inherent strength of specially selected materials enhanced by proper heat treatment and hardening.

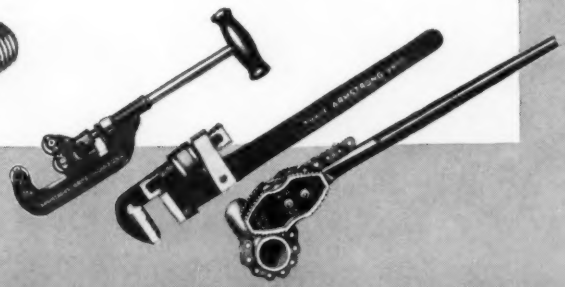


UNIFORM QUALITY — the uniform quality made possible by modern manufacturing methods, in a specially-built plant equipped with every needed quality control. The name ARMSTRONG with the Arm-and-Hammer Trade Mark is universally recognized as a guarantee of finest quality.









ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

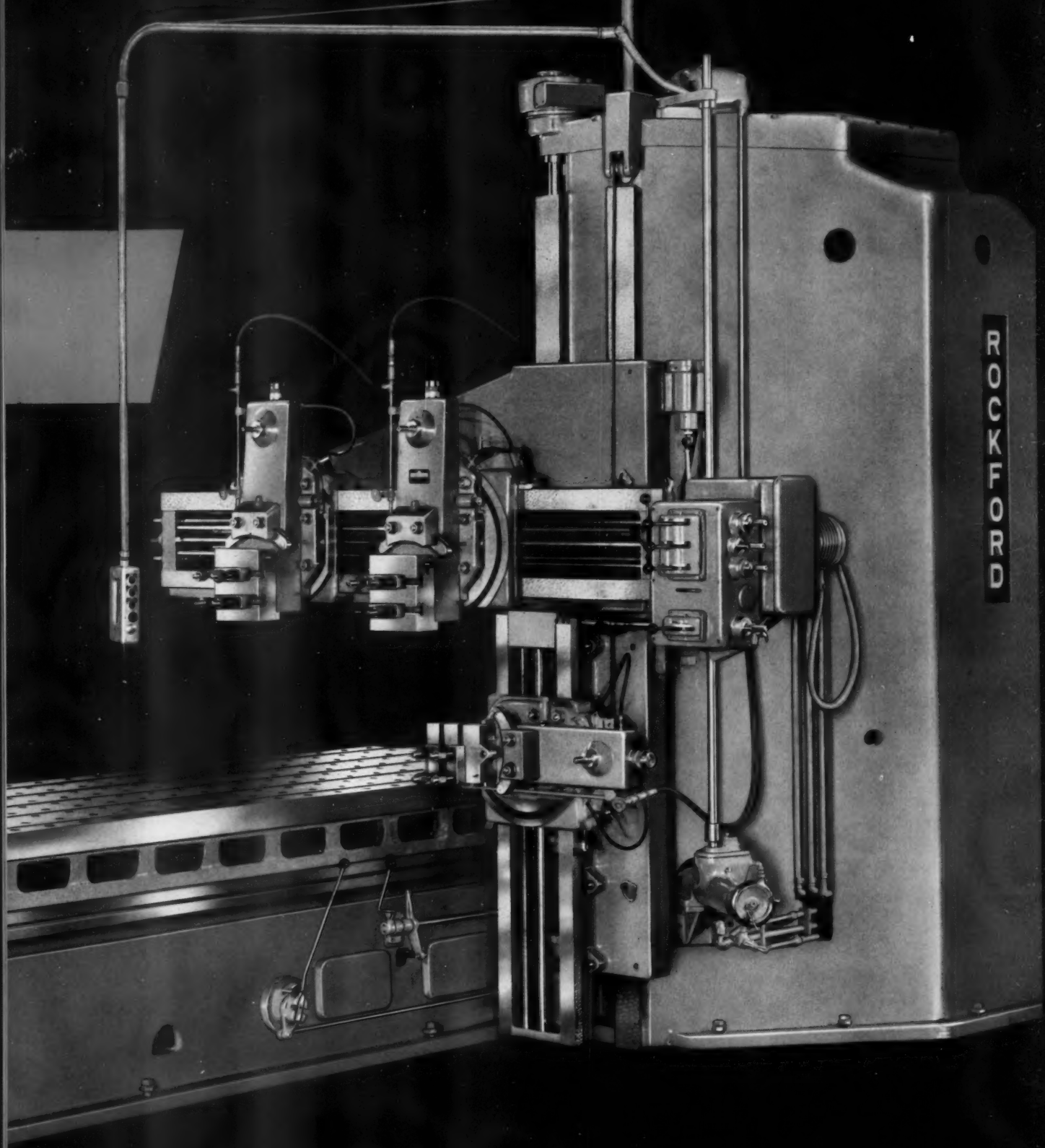
5215 WEST ARMSTRONG AVE. • CHICAGO 30, ILLINOIS

hydraulic

power and speed

The big line of modern Rockford Hydraulic Planers has everything it takes for finer, faster, lower-cost planing. With the exclusive new Triple Circuit, and push-button controls, cutting speeds and forces are now instantly available to most economically machine every type of metal—from free cutting materials to the toughest steels. For the complete story on how to obtain greater profits in modern planing with the unique production advantages of Rockford Hydraulic Planers . . . ask a Rockford Machine Tool Co. representative . . . or write us direct.

UNBRAKO AT WORK



Hy-Draulic
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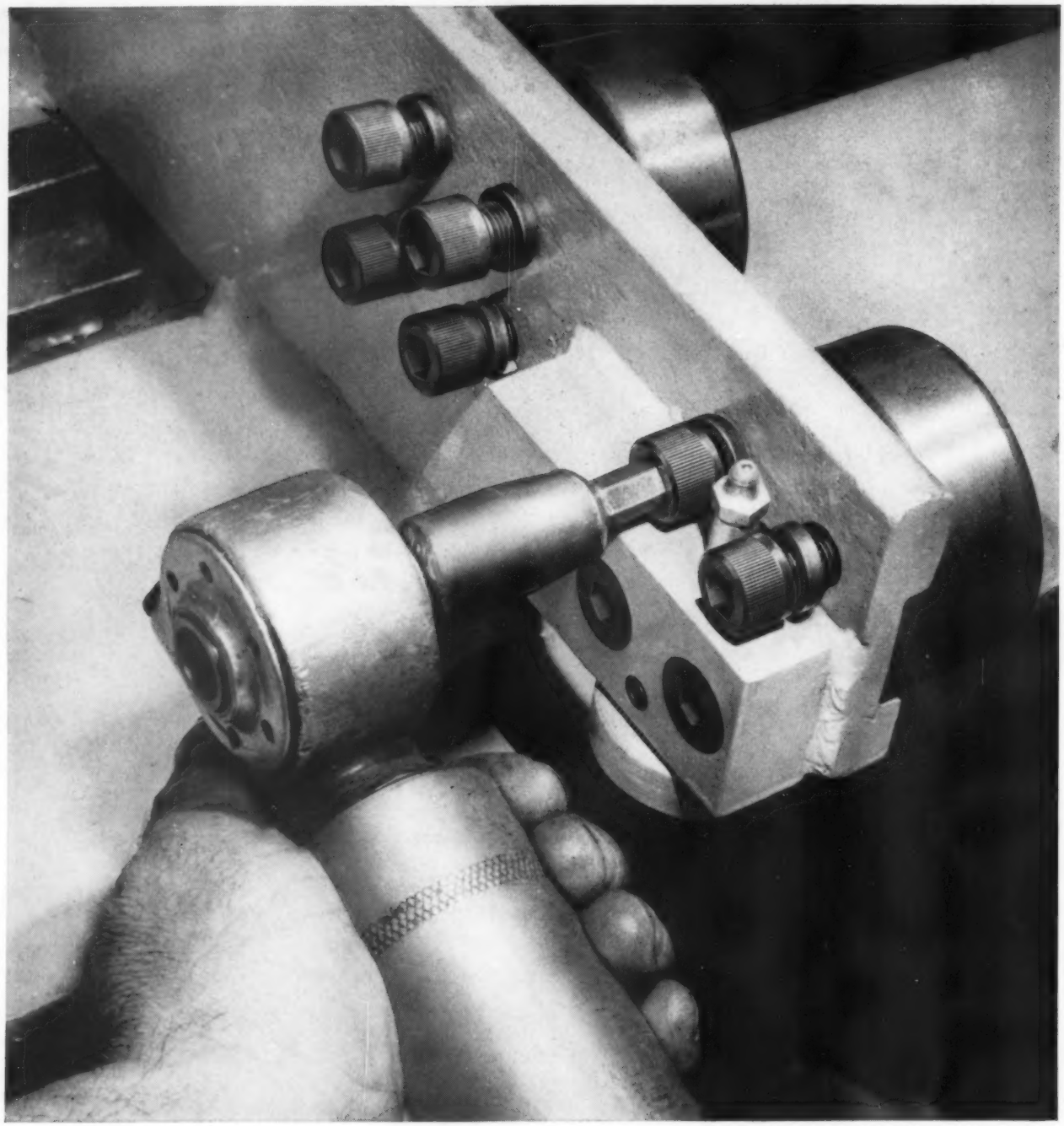
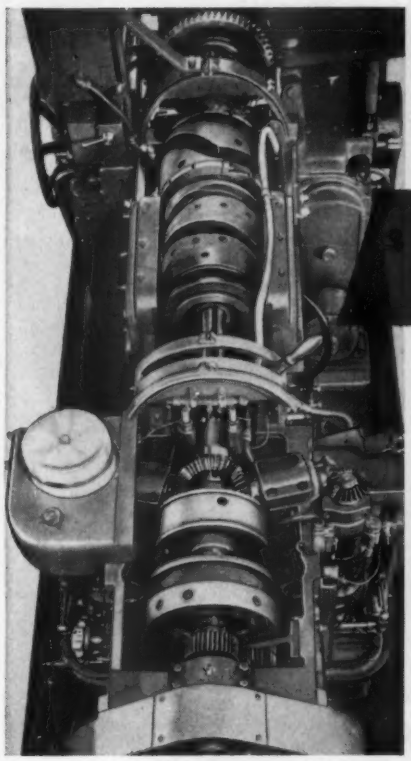
ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

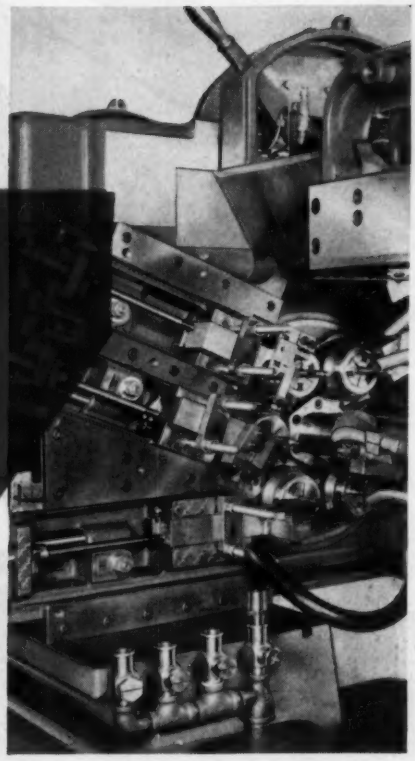
UNBRAKO AT WORK



UNBRAKO SOCKET HEAD CAP SCREWS provide additional safety and increased efficiency on industrial lift trucks. Sixteen of them are used to fasten the side thrust fork carriage rollers which reduce the stresses caused by off-center loading. These standard UNBRAKOS have heads forged for strength, and sockets of uniform depth and size for strength and maximum torque in wrenching. Fillets and threads are formed to provide continuous grain flow throughout the screw. For the UNBRAKO story, see your authorized industrial distributor. Or write STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.

UNBRAKO SOCKET SCREW DIVISION SPS JENKINTOWN, PENNSYLVANIA



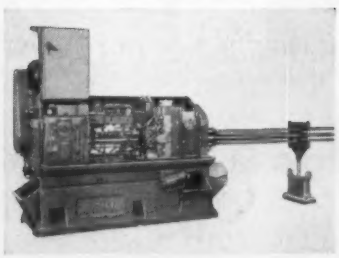


Seven Fast Changeover Models

With the prospects of improved tool materials ever decreasing the actual machining time of work on Multiple Spindle Automatics, long runs tend to become short runs. Facility that decreases the time for job changes becomes more important to low-cost production.

Conomatics are available in as many as seven fast changeover models. These are the 9/16", 1", 1⅝" Sixes, and the 2⅝", 3½", 5", and 5¼" Fours.

These models are equipped with dial adjustment of working stroke of all slides, without making necessary change of total stroke or positive stop settings. Write, wire, or phone for literature descriptive of these features and other facilities available to users, or prospective users.



Conomatic

THE MACHINE TOOL SHOW CHICAGO, ILL. BOOTH 401

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

PROVEN DESIGN PLUS LODGE & SHIPLEY "KNOW HOW"

gives you a better brake for every dollar of purchase price

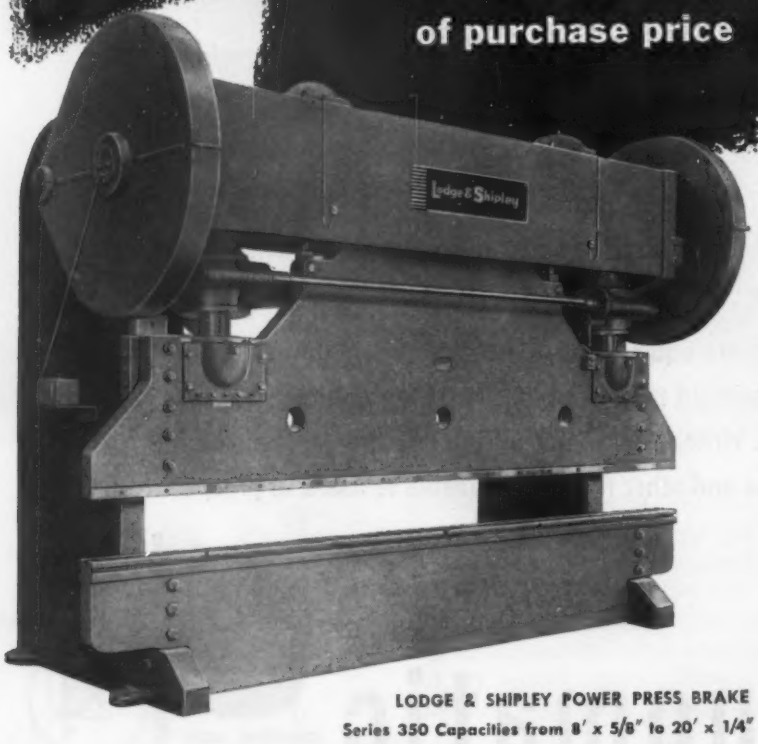
From a background of more than 100 years of experience in building heavy metalworking equipment, Lodge & Shipley is producing power press brakes equal or superior to any other.

Built to Lodge & Shipley standards of strength and accuracy, for long service and minimum maintenance, these power press brakes offer many features which contribute to cost savings.

For example, the air clutch and spring brake is specifically designed for press brake service. The smoothly operating positive clutch is installed in a heavy, balanced flywheel. When the clutch is disengaged, the disc-type friction brake is automatically applied, positively holds the ram is any position.

Give yourself a *better brake*, check the many features of Lodge & Shipley power press brakes against any other power press brake . . . then make your decision.

Write for FREE Bulletin PB-4 and the name of your nearest distributor.

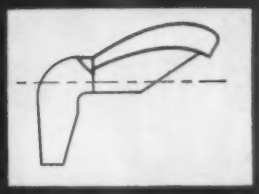


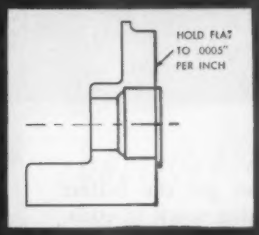
LODGE & SHIPLEY POWER PRESS BRAKE
Series 350 Capacities from 8′ x 5/8″ to 20′ x 1/4″

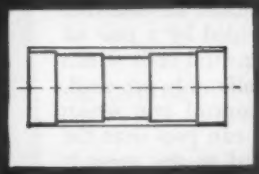
SEE THE LATEST IN PRESS BRAKES
At The Machine Tool Show, September 6-17

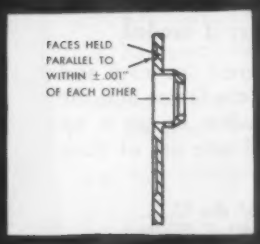
THE Lodge & Shipley COMPANY
HAMILTON DIVISION • Hamilton 2, Ohio

Setup and Tooling Costs ON THE HOUSE









How One Leading Contract Shop Affords It

What's the secret of absorbing these costs—with competitive bidding and profit margins as they are in the contract shop field today?

"Simple," says C. C. Gregson, President, Illinois Gage and Manufacturing Company of Franklin Park, Ill., leading supplier of highly specialized machining of aluminum and magnesium castings. "We are able to produce a better job faster and hold close tolerances more economically than shops *provided with conventional equipment*. Setup and tooling is so minor that in most instances the customer is not even charged for it."

Note that phrase "conventional equipment"—it's the pay-off! The one 16" and the two 13" Monarch lathes you see pictured below are all Monarch Air-Gage Tracer equipped. So is the 10" Monarch that isn't in the picture. There's your difference!

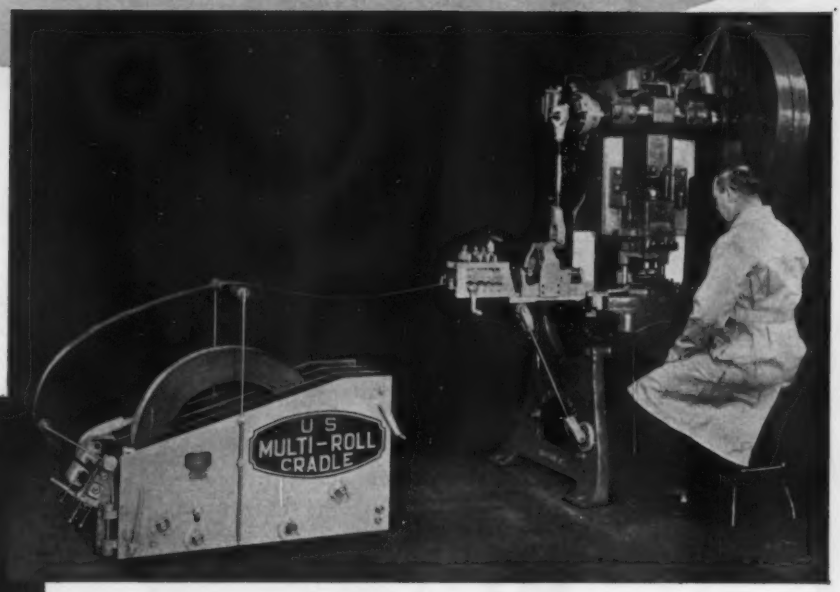
To quote again, "we have found they speed up production anywhere from 10% to 90%." Air-Gage Tracers in your plant would likely enable you to realize similar savings. Why not investigate? . . . ***The Monarch Machine Tool Co., Sidney, Ohio.***

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

For maximum press room efficiency . . . For controlled unwinding of all types of stock in coils . . .

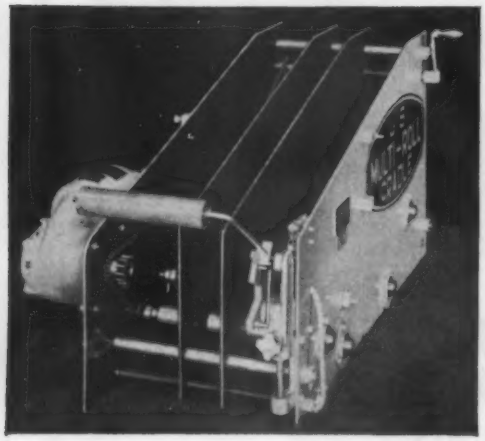
THE U. S. MULTI-ROLL CRADLE



U. S. Multi-Roll Cradle Model ACC-1-9C, with four power-driven rest rolls plus a pair of power-driven take-out rolls. A geared motor of 1/3 H.P., 155 R.P.M. gives output speeds up to 80 feet per minute. For special applications other motors can be provided. The cradle will handle stock up to ⅛ inch in thickness, 9 inches in width, and coils with OD up to 40 inches. Photo shows Multi-Roll Cradle set up with a U. S. Stock Straightener and a U. S. Slide Feed to make the press completely automatic.

Above: In the smaller sizes, coils of stock can be easily rolled into the cradle by one man. During the loading the take-out roll assembly is released by a trigger latch and swung to the side. It snaps securely into place when swung back into operating position.

Below: Model ACC-1-9NT with four power-driven rest rolls only. This unit is designed so that power-driven take-out rolls can be added at any time.



With the U. S. Multi-Roll Cradle you can get the fullest benefits from the inherent advantages of using stock in coils. It has been designed to enhance press performance by unwinding stock in a steady, smooth run under complete control at all times. This is accomplished with four power-driven coil rest rollers mounted in self-aligning bearings and arranged in an arc to equalize weight distribution. In addition, on Model ACC-1-9C further power is provided by a pair of power-driven take-out rolls to completely unwind coils which have a tendency to sag or slip when rest rolls only are used. Both sets of rolls are actuated by a loop control arm which operates through a micro switch. The stock can pass over the roll or press against it; either way, the feed to the press is positive and constant and can be adjusted to rates up to 80 feet per minute. When handling some types of coils the power-driven take-out rolls may not be required and the cradle can be purchased with the four power-driven coil rest rolls only (Model ACC-1-9NT). On this unit the power-driven take-out rolls can be easily added later if needed.

The U. S. Multi-Roll Cradle is also designed for easy and rapid coil loading, and the compactness of the frame and the controlled unwinding feature make it possible to set it up close to the press for most economical and safe use of floor space.

Get full details and specifications of the U. S. Multi-Roll cradle in special bulletin 90-A. Write for your copy today.

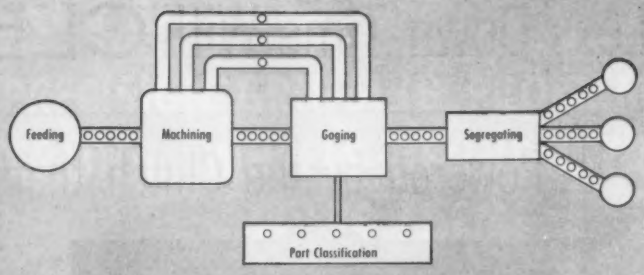
U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

AUTOMATION DEMANDS *RELIABLE CONTROLS*



Dimensional control is the very heart of automation for the metalworking industry. Consequently, care in the selection of In-Process and Post-Process control devices is very important.

As a long recognized leader in air, electric and electronic gaging, Sheffield is prepared to furnish either:

- **Packaged controls and tooling ready to install**
- **Complete automation gaging and transfer systems ready to operate**

FUNCTIONS and ADVANTAGES

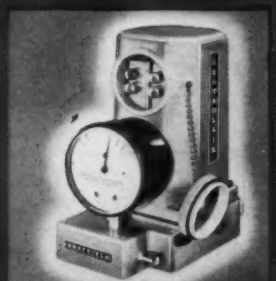
- Determine minute dimensional variations, rapidly and with repetitive precision
- Initiate warning signals
- Actuate control mechanisms
- Segregate acceptable, oversize and undersize parts
- Accurately classify parts by sizes
- Accommodate almost limitless range of tolerances
- Operate with interchangeable tooling
- Are small, compact and easily mounted
- Have unusually long, trouble-free service life
- Are easily interchanged

7125

Shown here are a few of those Sheffield control units so widely used in automated systems.

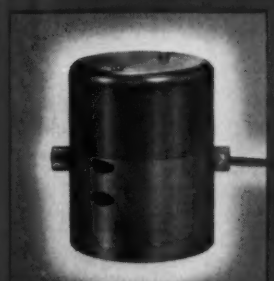
AIRLECTRIC

A limit type pneumatic control to actuate signals and relays.



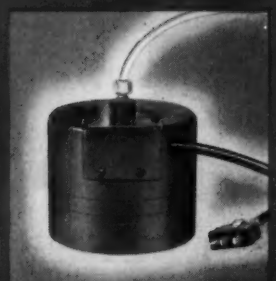
LECTROLAIR

A sealed-in control to actuate signals and relays and also to give visual size indication.



DIFFERENTIAL

A gage head for checking taper, hole parallelism or hole center distance and converting the result into an actuating electrical impulse.



VARIATION

A pneumatic gage head for external or internal dimensions and face to axis runout—converts the result into an actuating electrical impulse.

See us at the Machine Tool Show, Booth 1305

MANUFACTURE AND MEASUREMENT FOR MANKIND

For more detailed information, write for Bulletin AU-1154

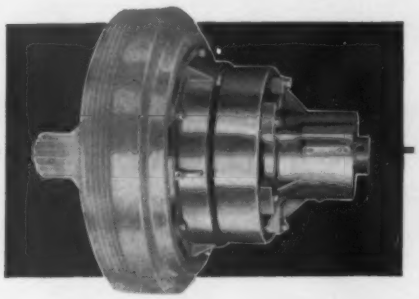
The Sheffield Corporation
Division 500
Dayton 1, Ohio, U.S.A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

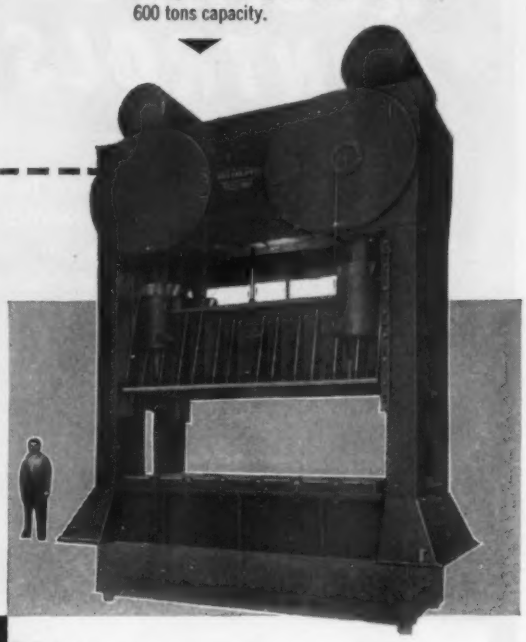
Less Down-Time With CLEVELAND Presses

Powered by the Clutch that's

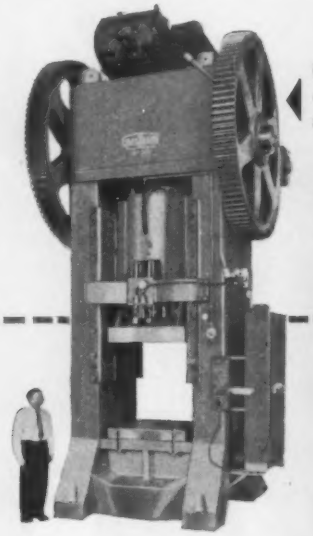


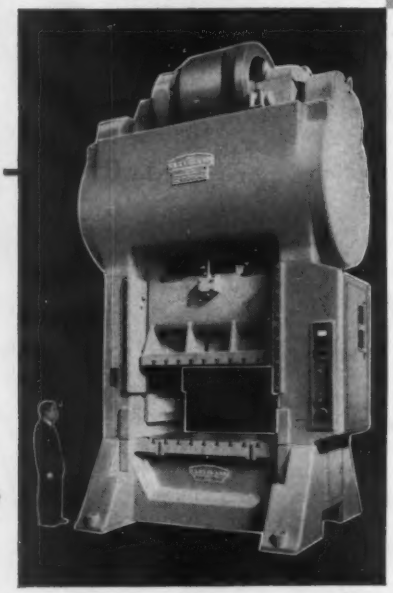
"Revolutionizing" Production

Cleveland S 4-600-204-102 Four Point Press, 40" stroke, 102 x 204" bed area, 600 tons capacity.



Cleveland S 1-800 Single Crank Press double geared, 16" stroke, 48 x 42" bed area, 800 tons capacity.





Cleveland S 2-350-60-42 Double Crank Press, 8" stroke, 42 x 60" bed area, 350 tons capacity.

It doesn't matter which of the 11 types of Cleveland presses best meets your requirements. For as long as it is equipped with our patented Cleveland Clutch, you can be confident that you are getting a press that will give you the best performance obtainable. This proven clutch unit assures minimum down-time, positive, fast control and lower operating costs.

Designed with a minimum number of parts, the patented Cleveland Drum Type Friction Clutch requires only minor adjustments. There is less chance of failure. Its light-weight construction reduces horsepower required for operation. Operational studies prove it to be completely dependable.

Why not investigate the production economy built into every Cleveland Press Equipped with our patented Cleveland Drum Type Clutch. Won't you let us give you the complete Cleveland story? Write or call today!

1880 75 1955 YEARS OF CONSTANT PROGRESS *Diamond Anniversary*

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

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FABRICATING TOOLS

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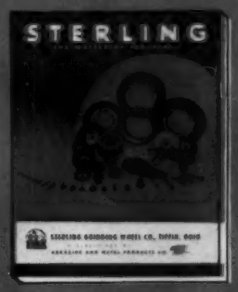
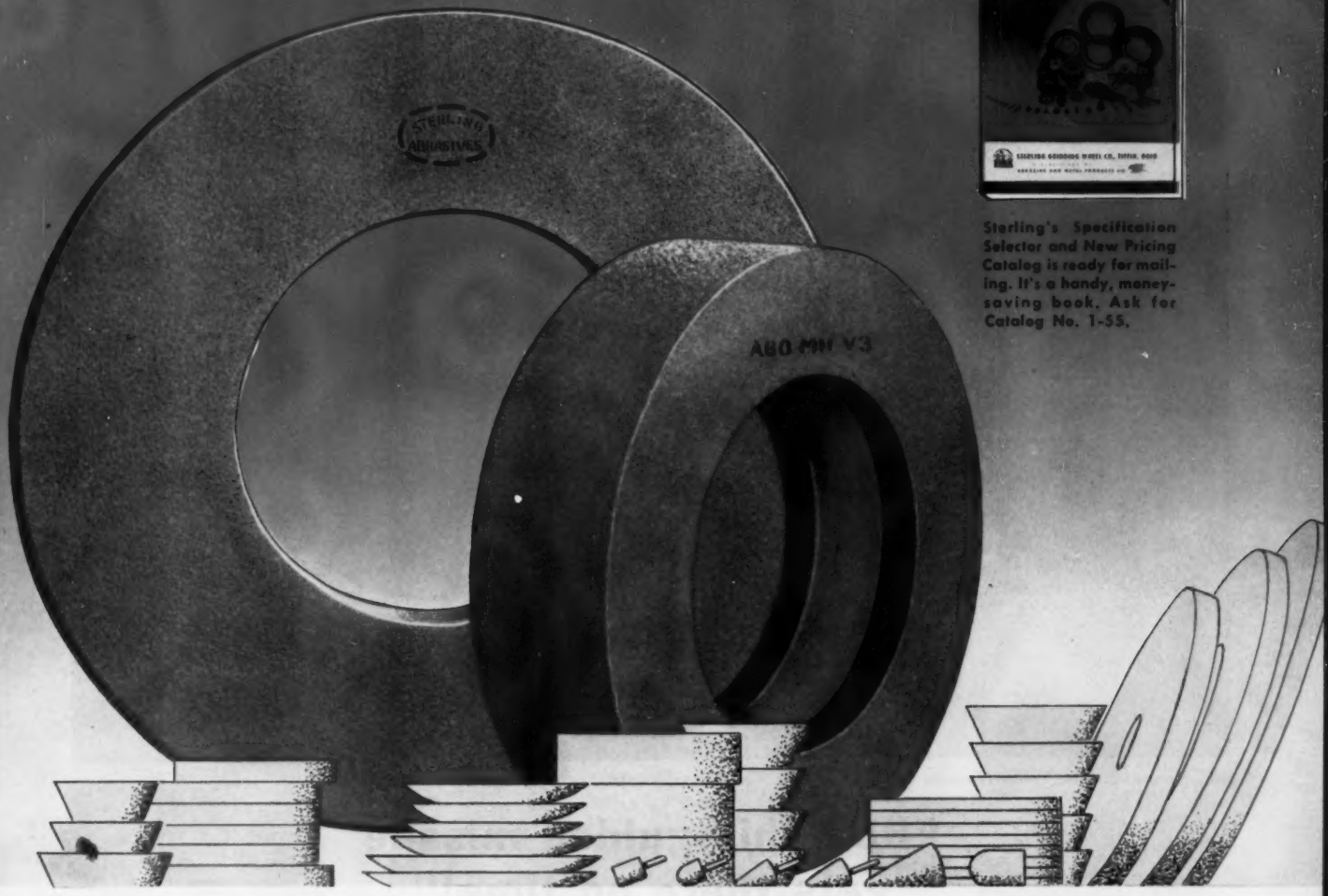
WRESTLING

WITH PRECISION GRINDING PROBLEMS? LET STERLING "WHEELS OF INDUSTRY" SOLVE THEM!



Sterling's Specification Selector and New Pricing Catalog is ready for mailing. It's a handy, money-saving book. Ask for Catalog No. 1-SS.



Sterling's "Wheels of Industry" are engineered to your special needs for precision and faster production.

Although Sterling Grinding Wheels are custom-made to many specific job demands, there is no extra charge for premium performance. Their built-in quality is evident on every job.

Stop wrestling with grinding problems! At your convenience, try a Sterling test wheel on one of your more difficult jobs. Write or wire us today and an experienced abrasives engineer will call and provide a quick solution.

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STERLING GRINDING WHEEL CO., TIFFIN, OHIO

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A&M COMPANY

DISTRIBUTORS IN ALL PRINCIPAL CITIES

Mr. Vincent Sillitta, Traffic Manager of Clarostat Mfg. Co., Inc., discloses

"How this guided missile gets there on time!"

". . . 5, 4, 3, 2, 1, *fire* . . . and a Clarostat product helps head the missile for an 'enemy' bomber!

"But before its deadly rendezvous, that tiny part of the missile's 'brain,' a Clarostat resistor, had to keep another vital appointment—with the Guided Missile production schedule.

"That date was kept by Air Express!

"We ship up to 15,000 pounds of Clarostat Resistors per month by Air Express. Their sizes range from the one mentioned above—finer than a human hair—to shipments weighing one hundred pounds and more.

"With Air Express help, we can meet extremely exacting delivery specifications. Yet most shipments cost *less* than by any other air service. A 25 lb. shipment from Boston to Toledo, for instance, costs $6.45. That's 5¢ *less* than the next lowest air carrier—and the service can't be compared!"

It pays to express yourself clearly. Say Air Express!

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*

CALL AIR EXPRESS . . . *division of* **RAILWAY EXPRESS AGENCY**

One hour

1800 lbs.-rough

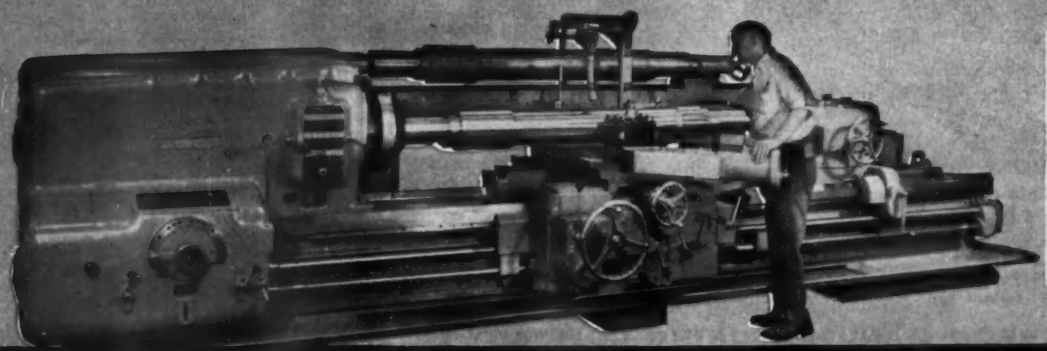
1300 lbs.-finished

One hour to finish turn this Diesel Locomotive Driving Axle from the rough forging, removing 500 pounds of chips and using 60 horse power cuts in the process.

This shows what a 25" "AMERICAN" Hydraulic Duplicating Lathe driven by a 50 H.P. motor can do. Production records of this kind are the rule rather than the exception and are being made daily.

"AMERICAN" Hydraulic Duplicating Lathes reduce machining time 50 to 75 per cent . . . cut costs to the bone . . . pay good dividends on the investment.

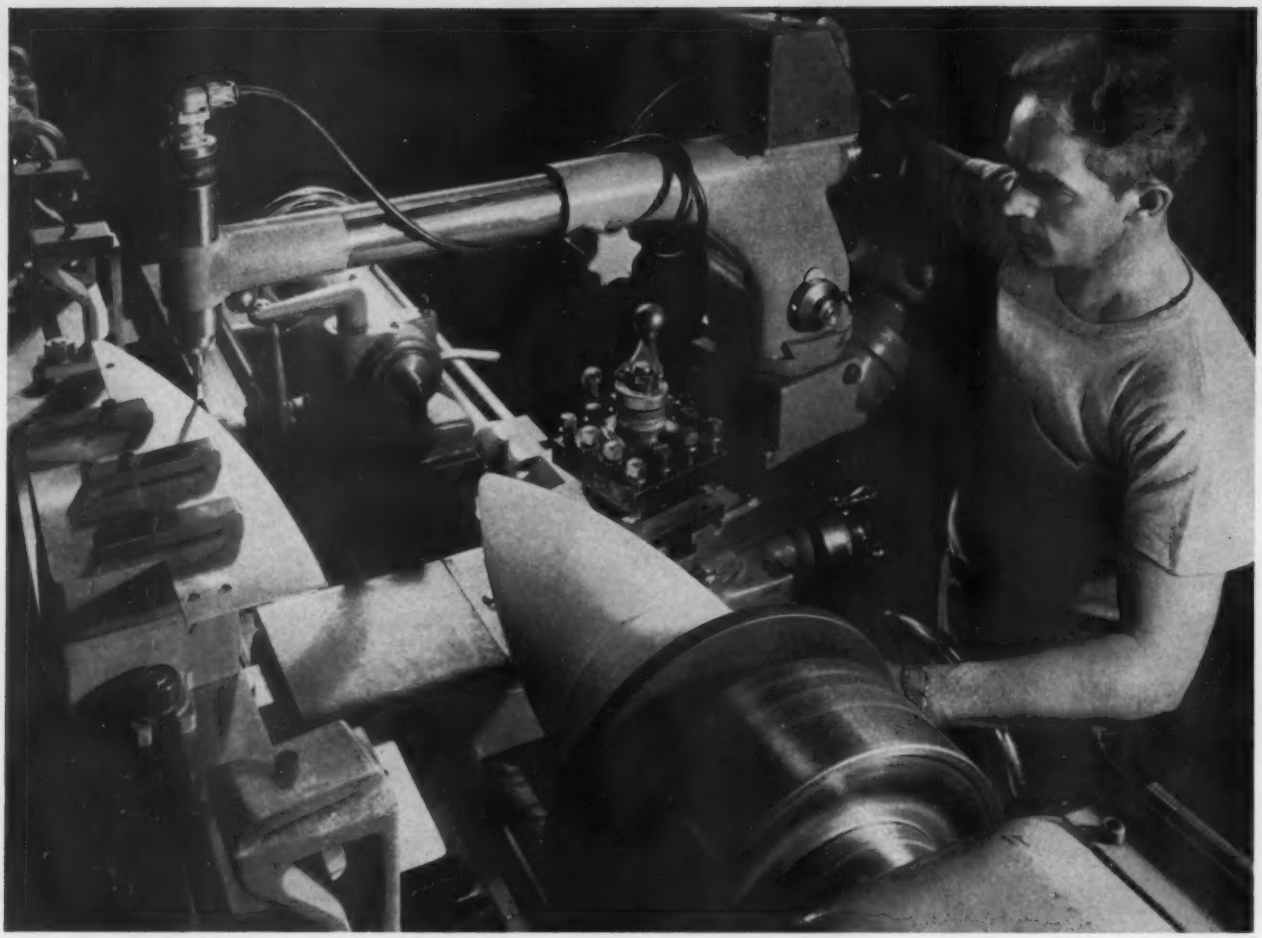
Repeat customers vouch for this in the most convincing way.



Bulletin No. 35 gives a complete description and shows many examples. It's yours for the asking.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills



How Electronic Duplication Reduces Your Precision Machining Costs

INCREASES PRODUCTION

You cut machining time by 50% or more with Raytheon's automatic precision duplicator. Human error is minimized and the need for gaging is eliminated. You save considerably on labor costs since the machine may be run by a relatively unskilled operator.

CONTOUR ACCURACY

You obtain uniform reproduction from flat templates or models for contouring, profile facing and boring to a tolerance of ±.0015" between template or model and work piece. Another important advantage is that this electronic duplicator as attached to machine tool in no way interferes with conventional operation when used for non-contouring purposes.

TROUBLE-FREE

Problems of leakage, temperature change and valve wear normally associated with duplicators are non existent in the electronic duplicator and maintenance requirements for Raytheon electronic duplicators are exceptionally low. These units have been in the field since 1949 and have an enviable service record.

WIDE RANGE OF APPLICATION

Your lathes, horizontal and vertical boring mills, millers and grinders may be used with Raytheon electronic duplicators. These duplicators are available in single motion—contour to 90°; dual motion—180°; two motion—360°.

For full information write Dept. 6260, Seyon Bldg., Raytheon Manufacturing Company, Waltham 54, Mass., or contact Voss Engineering Company, 7301 Penn Ave., Pittsburgh 8, Pa.

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RAYTHEON

Excellence in Electronics

KNOWN
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PRATT & WHITNEY
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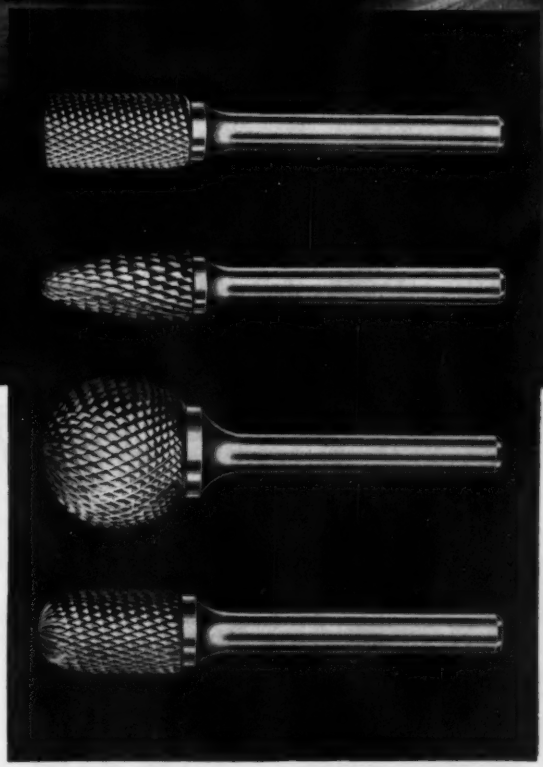

Able to cruise around the world at comparatively high speeds without surfacing, the atomic-powered submarine, USS Nautilus, is a giant stride into the future by American science and industry.

Throughout construction of this most advanced of all underseas craft by Electric Boat Division of General Dynamics Corp., P&W Kellerflex Burs — representing the ultimate advances in bur technology — were used exclusively. And aboard the Nautilus — where each part is weighed to the ounce and only the most essential equipment is carried — it is also significant that P&W Kellerflex Burs are included in the tool kits.

Yes, wherever only the finest will do, you'll find Pratt & Whitney Kellerflex Carbide Burs. For complete information, write on your Company letterhead for Circular No. 564.

SEE THEM AT BOOTH 1219

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1959
INTERNATIONAL EXPOSITIONS

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DIVISION NILES-BEMENT-POND COMPANY
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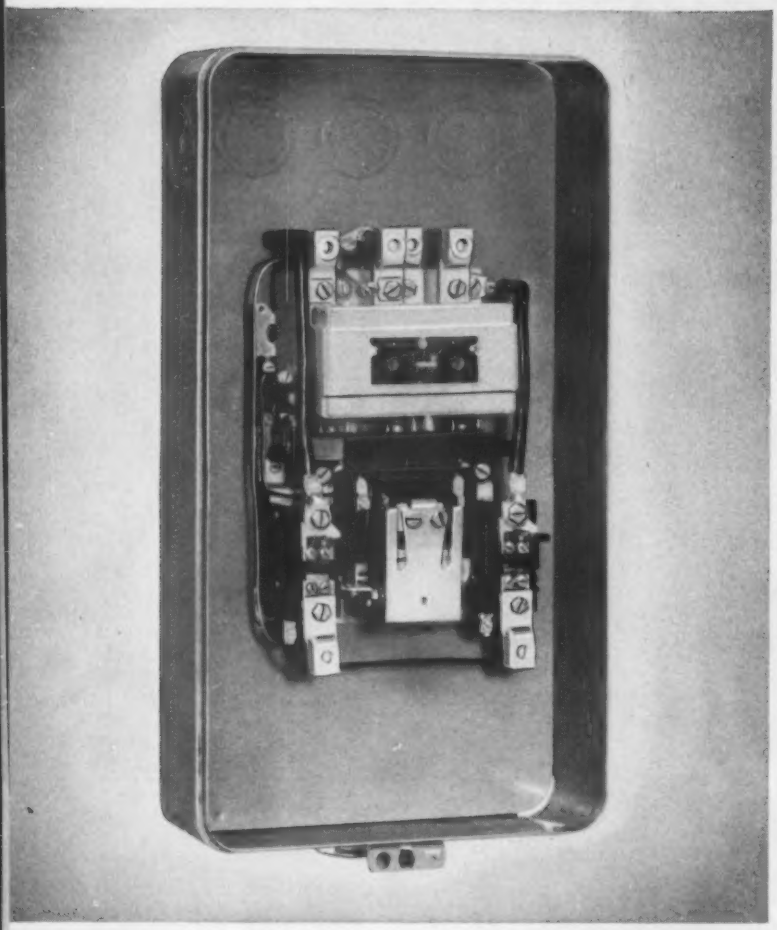
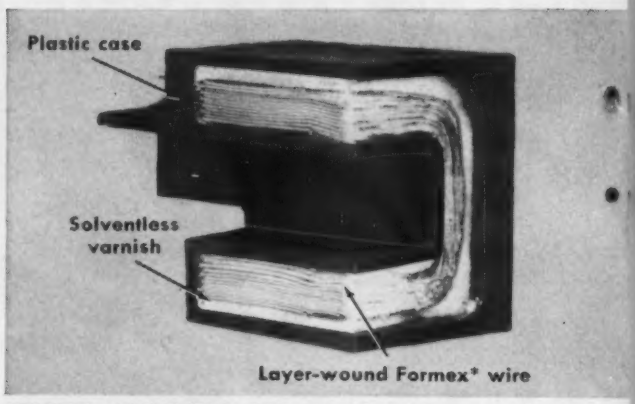
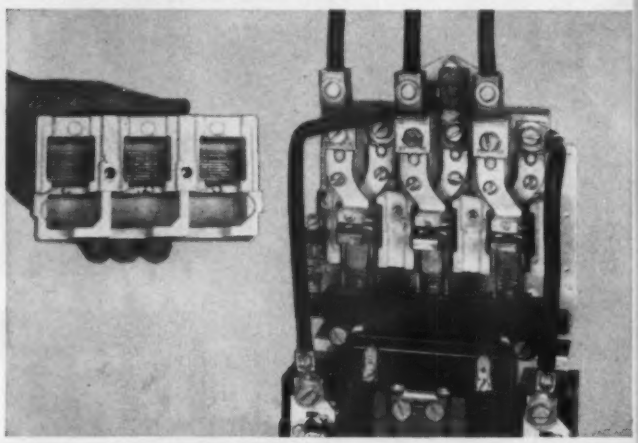
NEW G-E SIZE 4 STARTER



NEW SIZE 4 STARTER is designed for full-voltage starting of squirrel-cage motors. Bi-metallic overload relays may be easily changed from manual to automatic reset without removing from case.

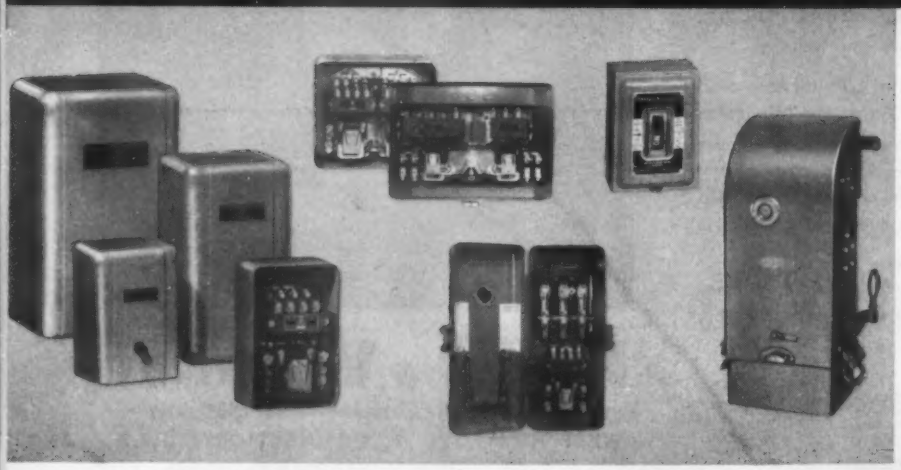


STRONGBOX MAGNET COIL is enclosed in a tough molded plastic case. Coil has firmly anchored terminals and is protected against dirt, oil and moisture.

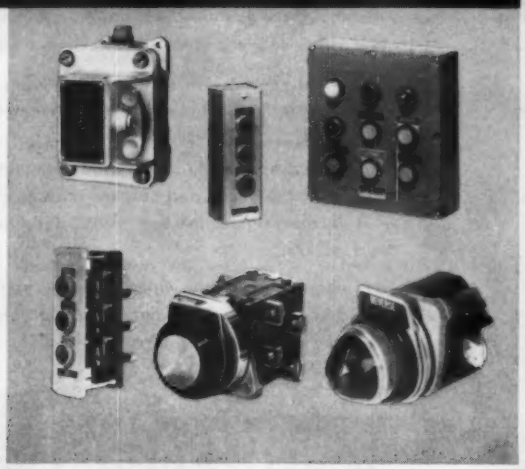


SPECIAL ALLOY CONTACTS give long weld-free life. Arcs are quickly extinguished by new blow-out design of contacts and cooling action of grids.

CHOOSE FROM THE COMPLETE LINE

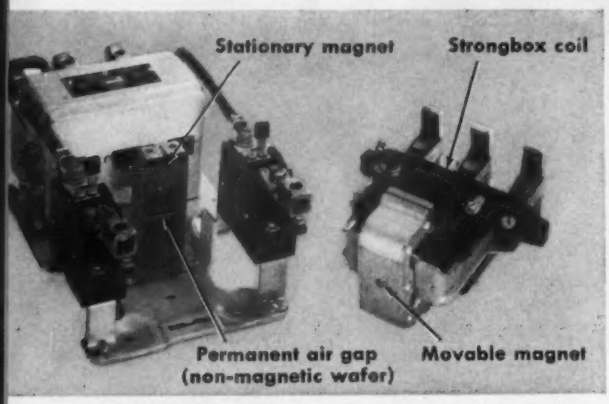


THOUSANDS OF STARTERS are available. They include: combination, reversing, multispeed, and manual and magnetic starters for full- or reduced-voltage starting. Starters are available in all popular NEMA and special enclosures.

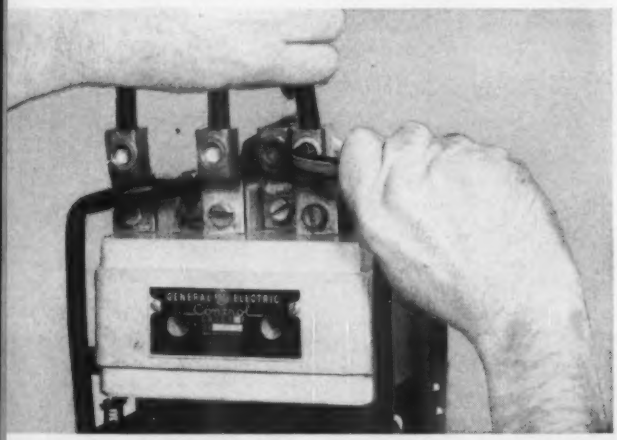


PUSH BUTTONS are furnished for standard, heavy-duty, or oiltight applications. Stations come in all NEMA enclosures.

FOR 25- TO 100-HP MOTORS



PERMANENT AIR GAP, away from striking surfaces, can't wear down and cause starter to "stick-in." Magnet design prevents contact chatter.



FRONT WIRED AND MOUNTED, new starter has solderless, pressure-type terminals for wires from AWG No. 6 to 250,000 c.m. 3-point front mounting is easy.

New magnetic starter for squirrel-cage motors

General Electric now adds a new, compact, NEMA Size 4 starter to its complete line of magnetic starters. The new starter offers many customer-proved features of size 0 to 3 G-E magnetic starters, such as the strongbox coil and the permanent air gap.

INSTALLED FROM THE FRONT, the new starter has 3-point mounting, and is completely accessible from the front when mounted. Right up in front are the solderless, pressure-type terminals for easy wiring. Also, 3 electrical interlocks, in any combination, can be installed from the front without removing the arc chute or movable-contact assembly. A vertical or horizontal mechanical interlock is also available for reversing and multispeed controllers.

MAINTENANCE IS EASY, and a screwdriver is the only tool required. Contacts are readily changed, and both coil and contacts are removable from the front without disturbing power wiring.

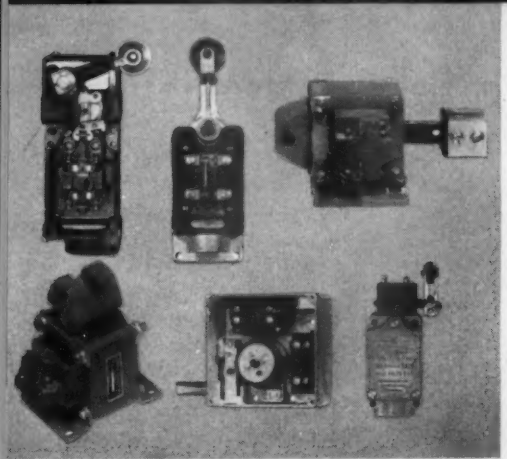
FOR MORE INFORMATION, contact your nearest G-E Apparatus Sales Office or Distributor, or mail in the coupon below. Ask for Bulletin GEA-6322.

**Reg. Trade-mark General Electric Co.*

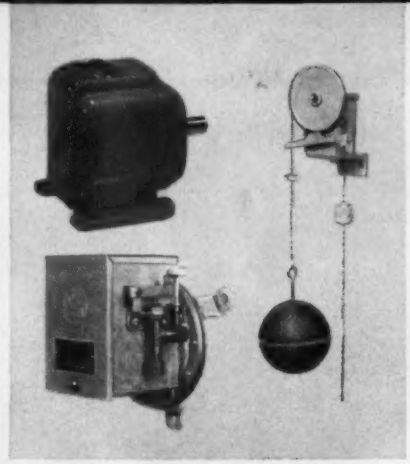
Progress Is Our Most Important Product

GENERAL ELECTRIC

OF G-E CONTROL DEVICES



LIMIT SWITCHES AND SOLENOIDS include lever and cam type limit switches, and the new strongbox solenoid.



G.E.'s LINE OF SWITCHES include pressure, vacuum, float, plugging and anti-plugging, pilot and reversing switches.

FREE NEW CATALOG of G-E General Purpose Controls.

Advertising and Sales Promotion Sect. D 734-2
General Purpose Control Department
General Electric Company
Bloomington, Illinois

Please send a free copy of:

☐ GEC-1260A New Control Catalog
☐ GEA-6322 New Size 4 Starter
☐ For reference ☐ For immediate project

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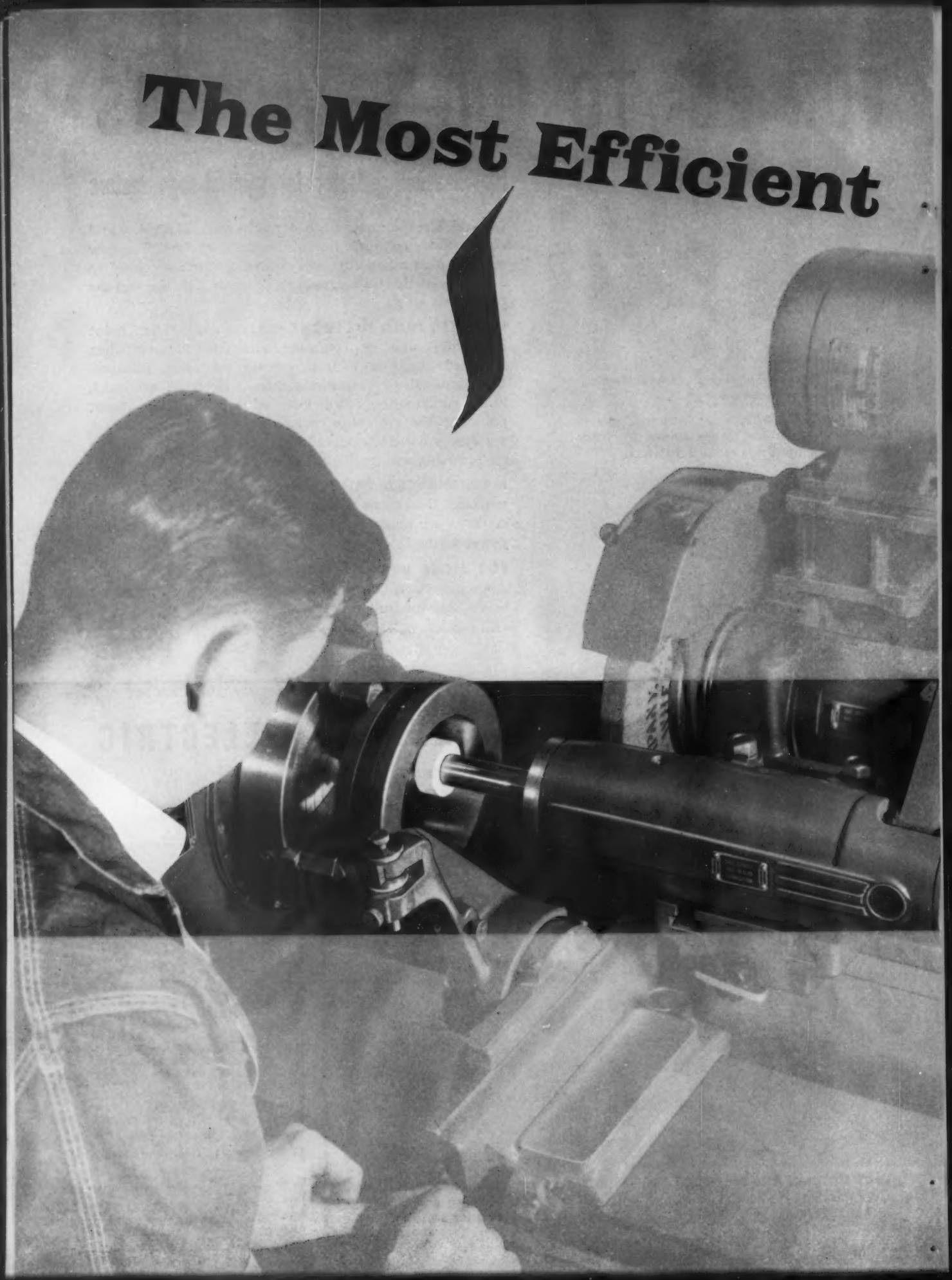
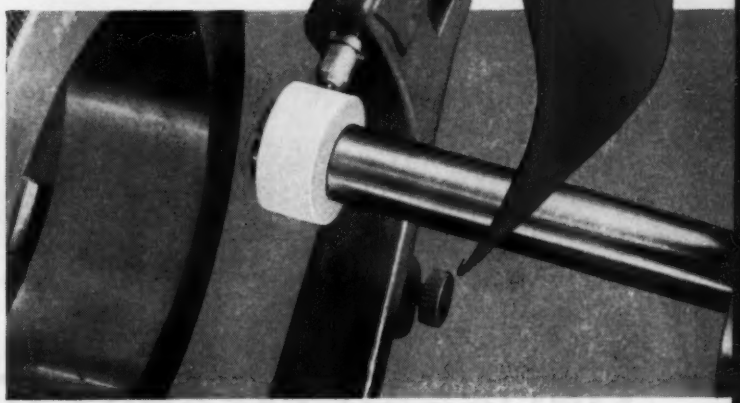
The Most Efficient



Universal Grinders

New Brown & Sharpe Universal Grinding Machines are making new operating economy possible for internal and external grinding. For example, an exclusive Set-Diamond wheel truing attachment cuts dressing time on average internal jobs as much as 60%! It's an "optional" you'll want. Other outstanding exclusive features provide: instant combination of separate manual operations into full automatic cycles . . . external or internal grinding instantly available in any position . . . multiple-taper grinding at one set-up . . . and super-accuracy performance that makes sizing to 0.0001" routine! A unique combination of flexibility and accuracy — the perfect "bridge" between conventional universals and single-purpose machines. Four machine sizes — all available with **ELECTRALIGN.** Write for full details. Brown & Sharpe Mfg. Co., Providence 1, R. I.

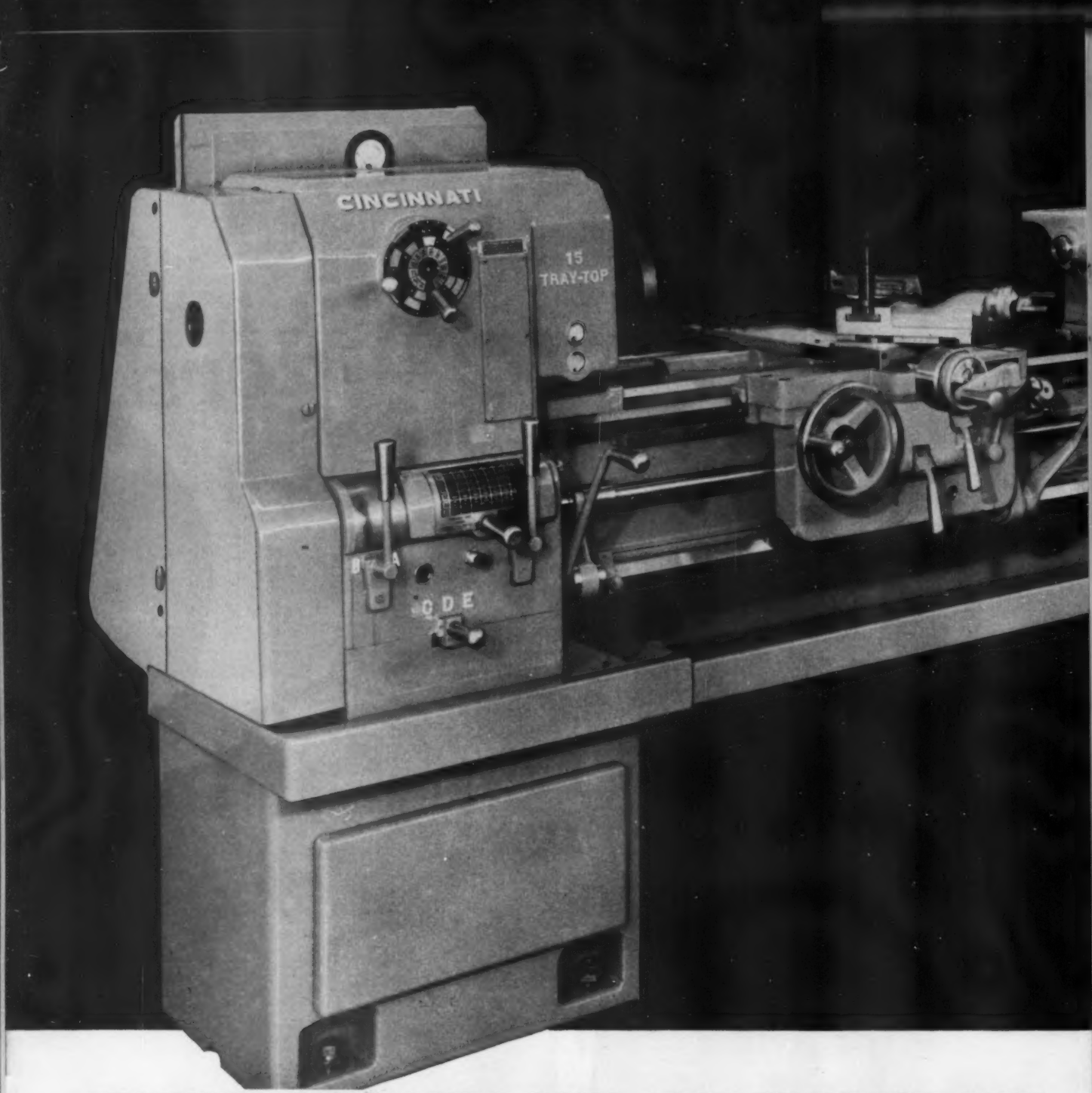
...save up to 60% on set-up time!



Exclusive Time-Saver. Set-Diamond internal wheel truing attachment (optional) requires only one set-up at start of job. Stays on machine. Swings out of way during grinding — swings back for subsequent dressings. Only one wheel position for sizing complete job.

Brown & Sharpe B·S

BUY THROUGH OUR PAY-AS-YOU-DEPRECIATE MACHINE TOOL PLAN



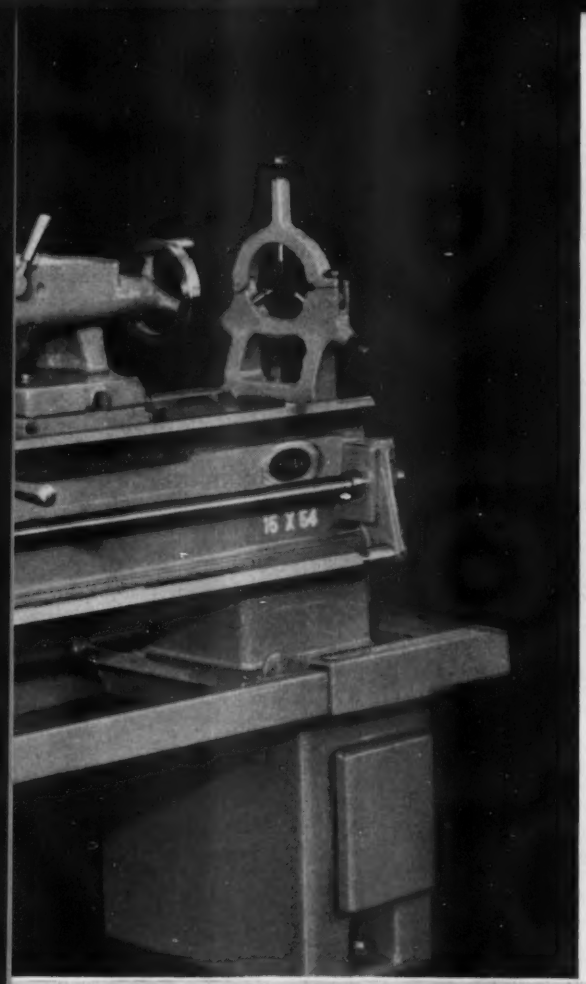
CINCINNATI EXPANDS LOW-COST TRAY-TOP LINE —NOW THERE ARE SIX NEW LATHES

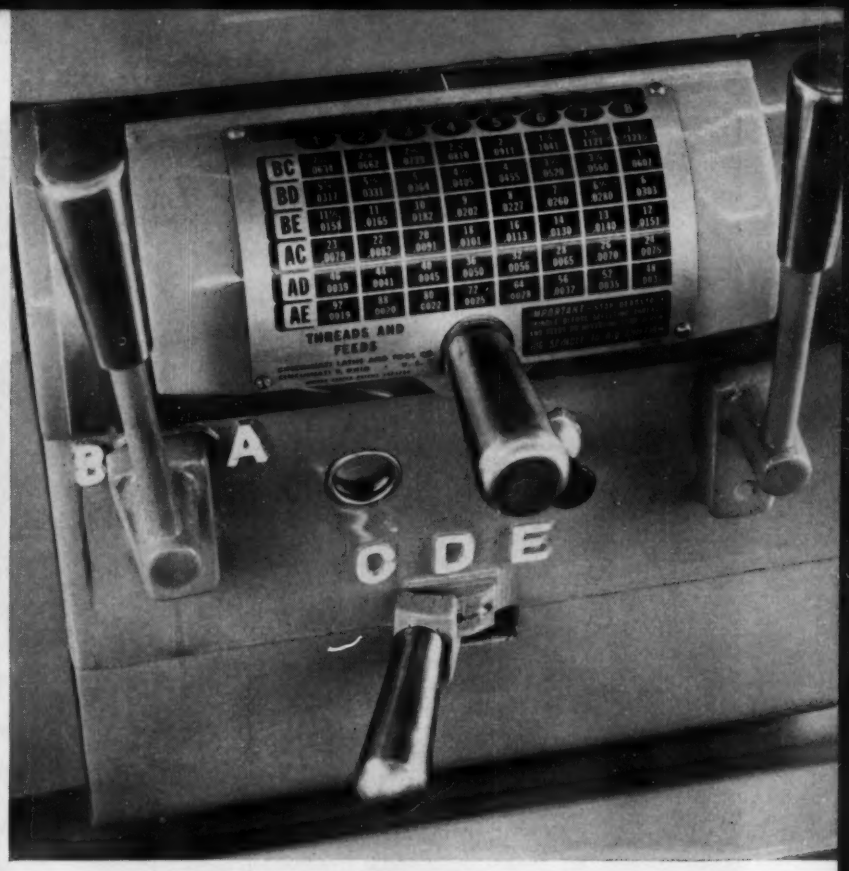
The good news here takes two directions: (1) Cincinnati Tray-Tops are available now in 10″, 12½″, 15″, 18″, 21½″ and 26″ sizes, and in engine, toolroom and fixed gap bed models. (2) The complete Tray-Top line is designed to provide *new* production convenience and *new* operator safety.

To job shops, maintenance shops, schools and production shops, the new, complete line of Tray-Tops means that the majority of jobs can now be done on modern standard machines at a modest primary investment.

In every respect, Cincinnati Tray-Tops are precision machines, built to hold their accuracy through years of continuous hard work. Your local Cincinnati dealer will explain the solid business advantages you get with Tray-Tops. For the name of dealer nearest you, plus complete catalog material, write Cincinnati Lathe and Tool Co., 3246 Disney, Cincinnati 9, Ohio.

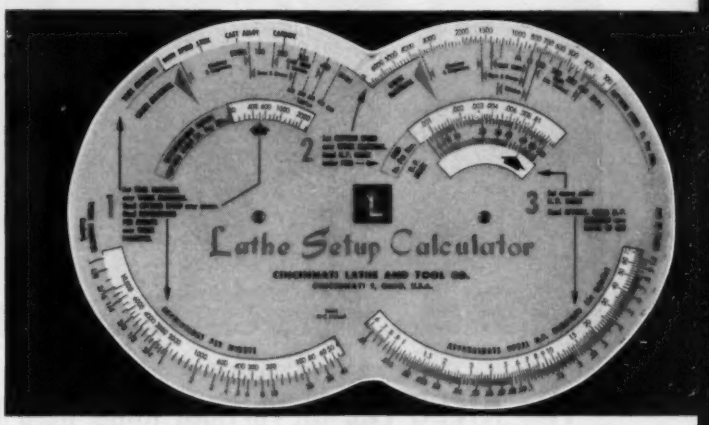
n display at





TOTALLY ENCLOSED QUICK-CHANGE BOX guards gears against dirt, chips and foreign matter. 54 thread and feed changes: range of 1½ to 92 threads per inch; range of feeds, .0019 to .1215.

COLOR-MATCH SPEED SELECTOR is simplicity, itself. No more reference to index plates and lever positions; just match up the color lines. Standard spindle speed ranges are 35 to 1200 rpm; 25 to 980; or 16 to 640; with higher ranges available at extra cost. Pressurized lubrication to bearings and gears. Three-bearing spindle. 3″ diameter spindle hole available on larger sizes.



Get your Cincinnati Turning Calculator now or during the MACHINE TOOL SHOW at BOOTH 309

With this new, attractive calculator, complete with instruction booklet—

IT'S EASY

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IT'S SIMPLE

. . . to determine the most economic cutting speed for your high production runs.

JUST

. . . print your name, firm, address, city, zone and state, and mail with $1 (check or money order) to Cincinnati Lathe and Tool Co., Cincinnati 9, Ohio.

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Enclosed is $_____ in payment for _____ Cincinnati Turning Calculator. Please ship to:

Name _____

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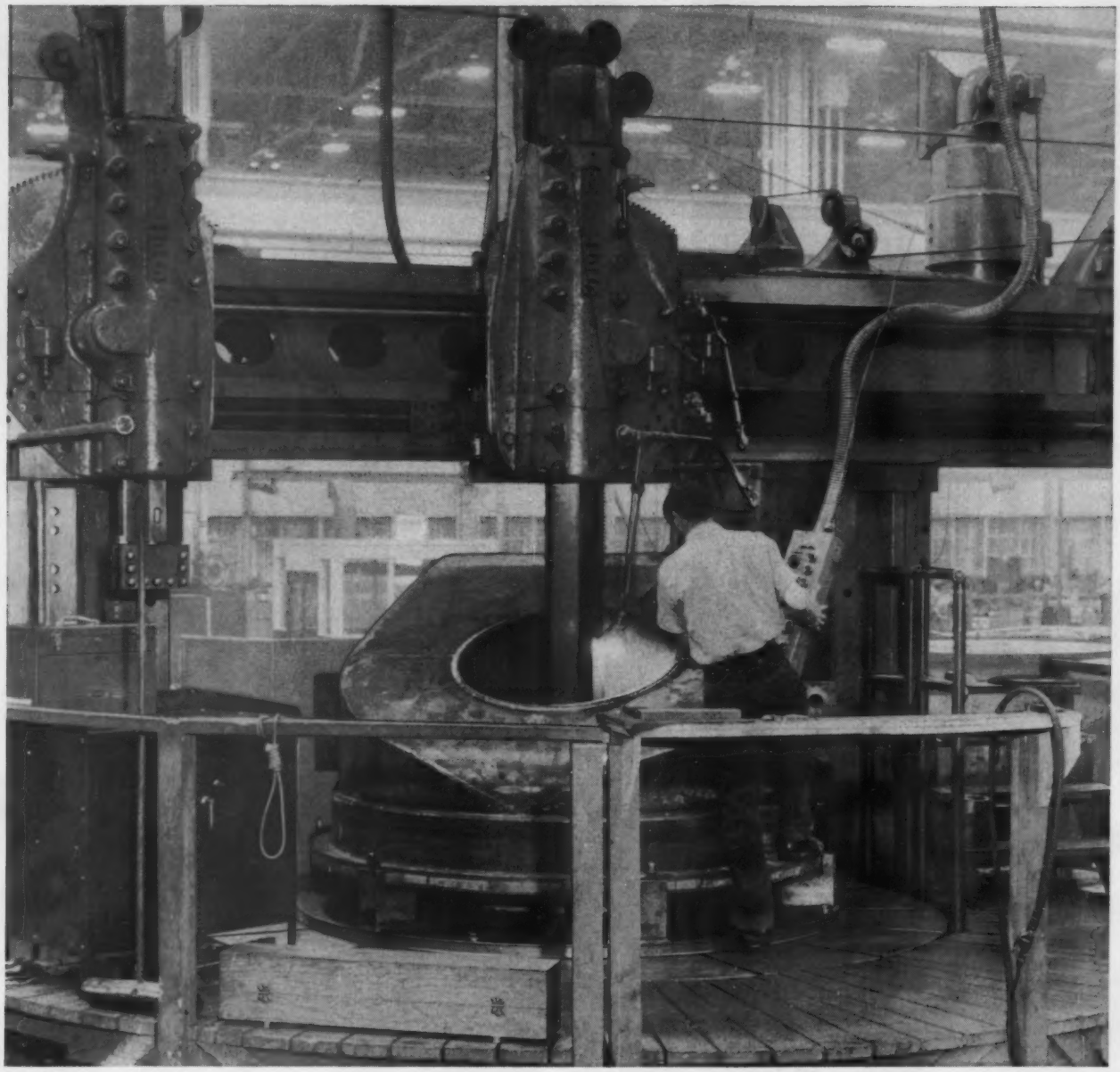

Two NILES 120-in. vertical mills help Carrier meet heavy production schedules

Two electronically controlled Niles 120-in. vertical boring mills (used on suction volutes) are giving Carrier Corporation, Syracuse, a big assist in meeting heavy production schedules. Faster operation and greater production are possible because specified speeds and feeds can be held *automatically* without constant adjustment. Precision control and operation are also an important quality control aid.

Maintenance is kept to a minimum because these rugged Niles tools are built to take the pressures and stresses of fast, deep-cutting carbide tools.

Like Carrier, *you* can do *your* big jobs better and faster with Niles tools. It will pay *you* to send today for our catalog containing complete specifications for vertical boring mills to 43 feet, heavy-duty engine lathes to 168 inches and other heavy machine tools. Please address: Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.

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THE MACHINE TOOL SHOW
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Stocked in ALL SIZES . . . Panther 5 Tool Bits are produced as a finish-ground product. They're carried in stock for immediate shipment in nine sizes of squares, from ¼" x 2½" long to 1" x 7" long . . . and in eighteen sizes of flats, ranging from ⅜" x ¼" x 3" long to 1½" x ¾" x 7" long. ● *Why not get in a trial order—see for yourself what they'll do!* Check your nearest AL representative or distributor . . . or write ***Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.***

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... never before ... so many features ...
so much quality ... at such low cost!

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The Lodge & Shipley 10" HI-TURN Lathe is a completely new concept in lathes. Establishing that lathes for high speed production rarely utilized lead-screws, Lodge & Shipley eliminated the leadscrew and its complicated gearing ... added other features for high production and accuracy at low cost. The result is a rugged lathe of high efficiency at a price substantially lower than conventional lathes.

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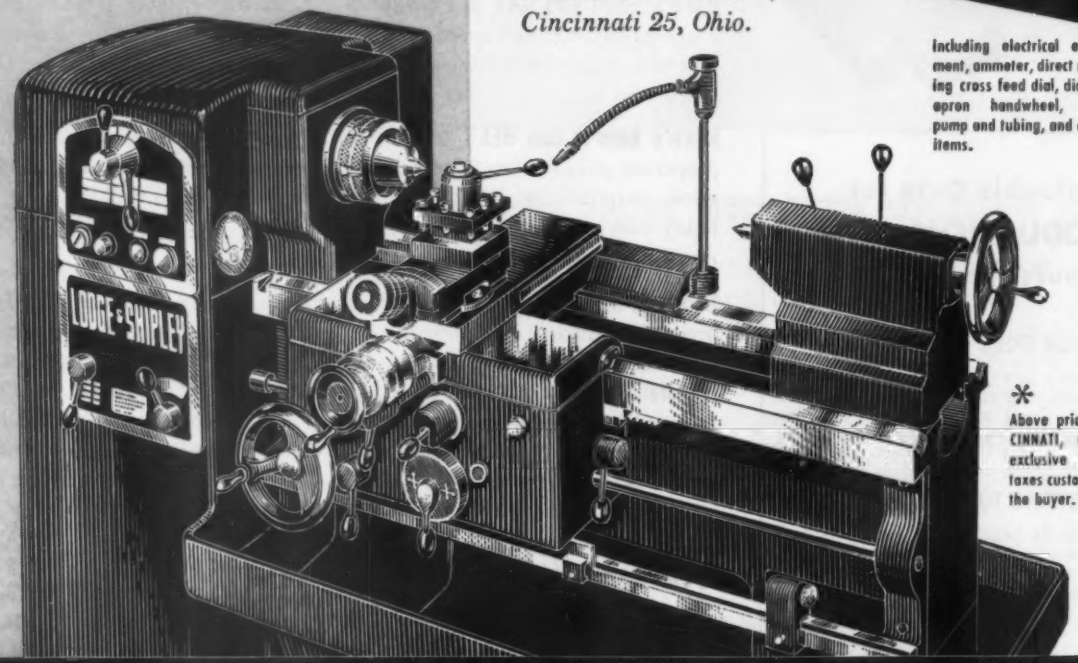

* Above price is FOB CINCINNATI, OHIO and is exclusive of applicable taxes customarily paid by the buyer.

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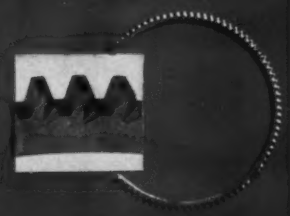
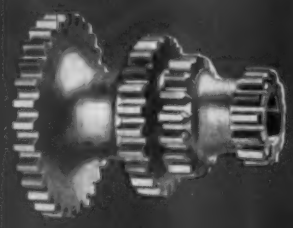


FLYWHEEL RING GEARS



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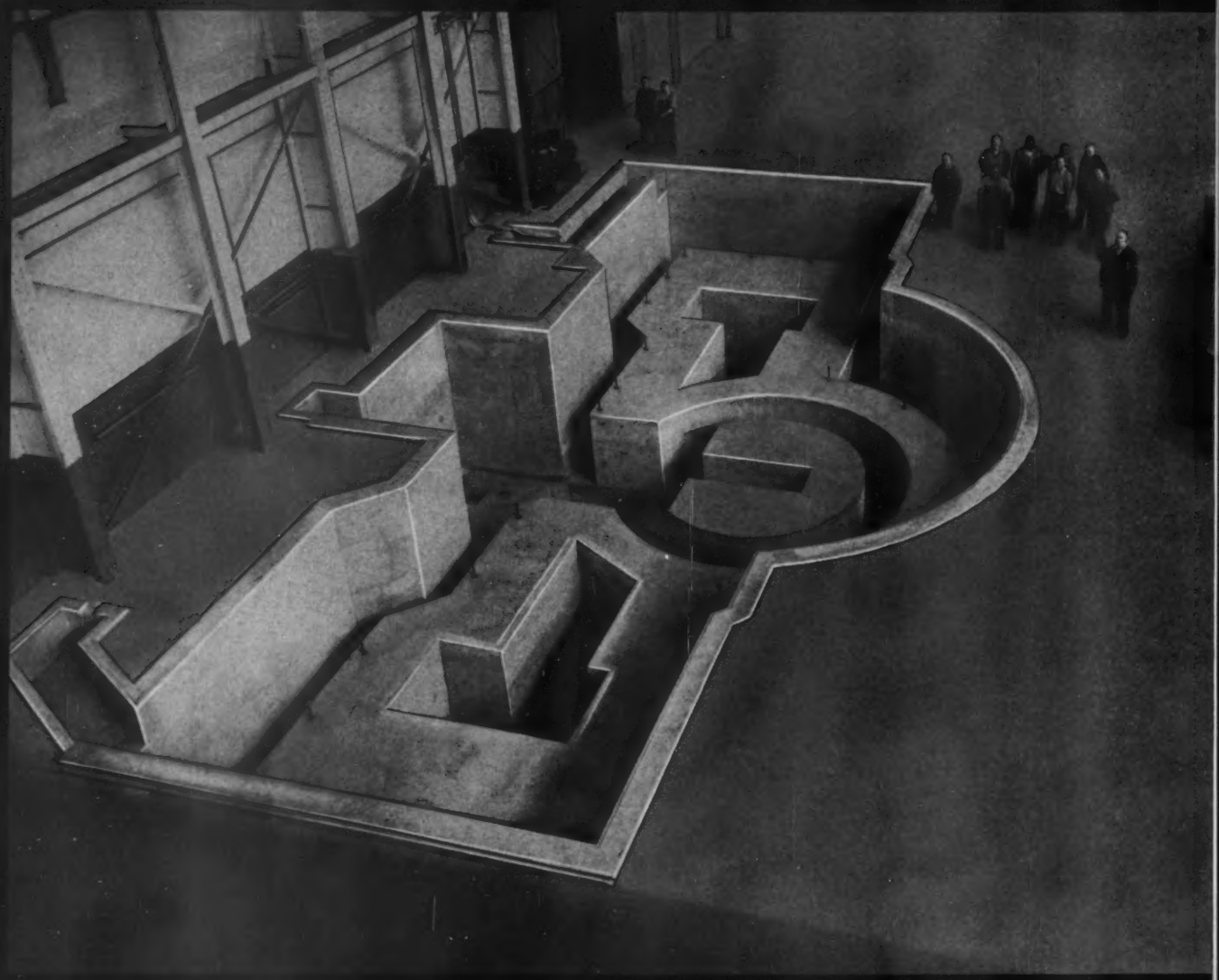

Foundation for the Betts 42 foot Vertical Boring and Turning

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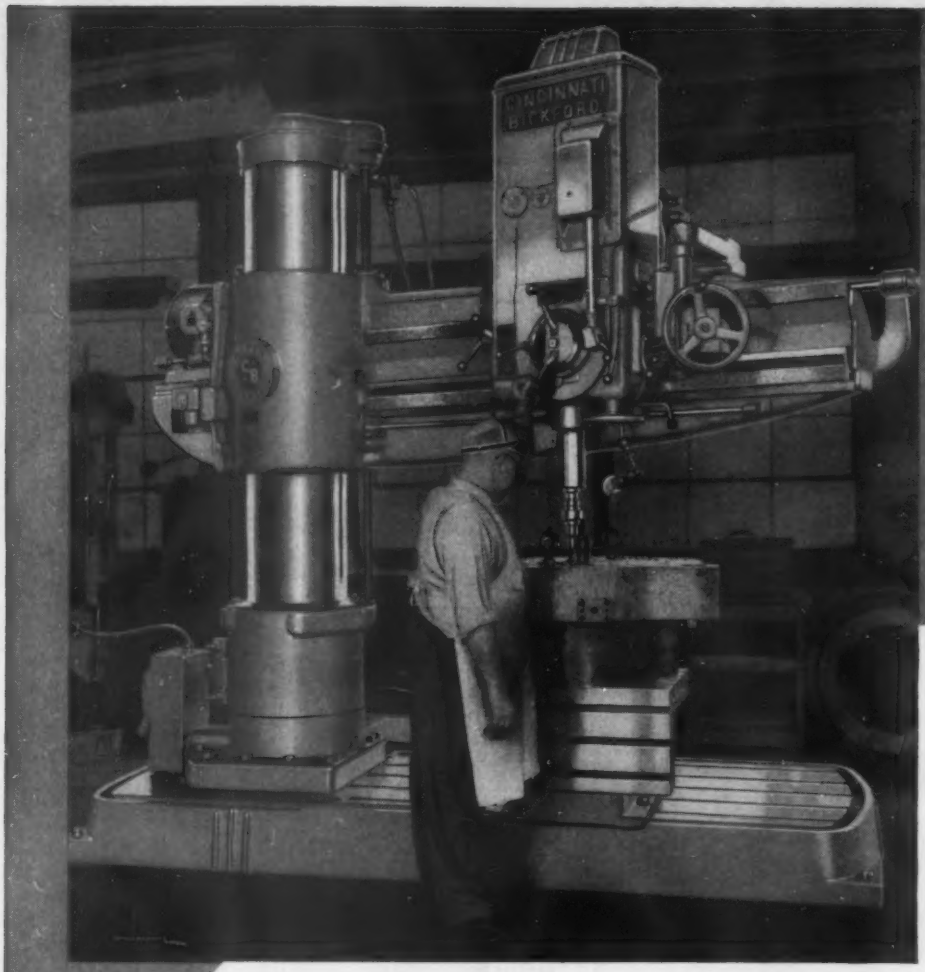
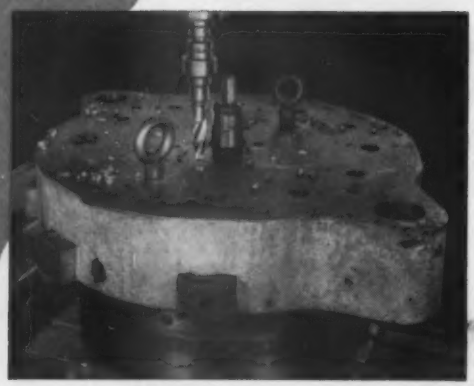


THE MACHINE TOOL SHOW
CHICAGO, ILL.

BOOTH 901

6-foot arm, 17-inch column Super Service Radial Drill at Kelsey-Hayes Wheel Company, Detroit, Michigan.

Photos courtesy of Kelsey-Hayes Wheel Co. Detroit, Michigan.



A typical tool-room job, involving a wide range of speeds and feeds, and extreme accuracy.

"excellent

IN OUR TOOL ROOM"

The tools, dies and fixtures for the mass production of Kelsey-Hayes wheels, brake-drums and other automotive parts can only be produced on accurate machines. Since 1930 Cincinnati Bickford radial and upright drills have been used here. The machine shown above, recently installed, is rated "excellent" by this user, because of its many features for accuracy, ease of operation, safety, and productive capacity. Investigate these advantages of Super Service Radials—Write for Booklet R-29.

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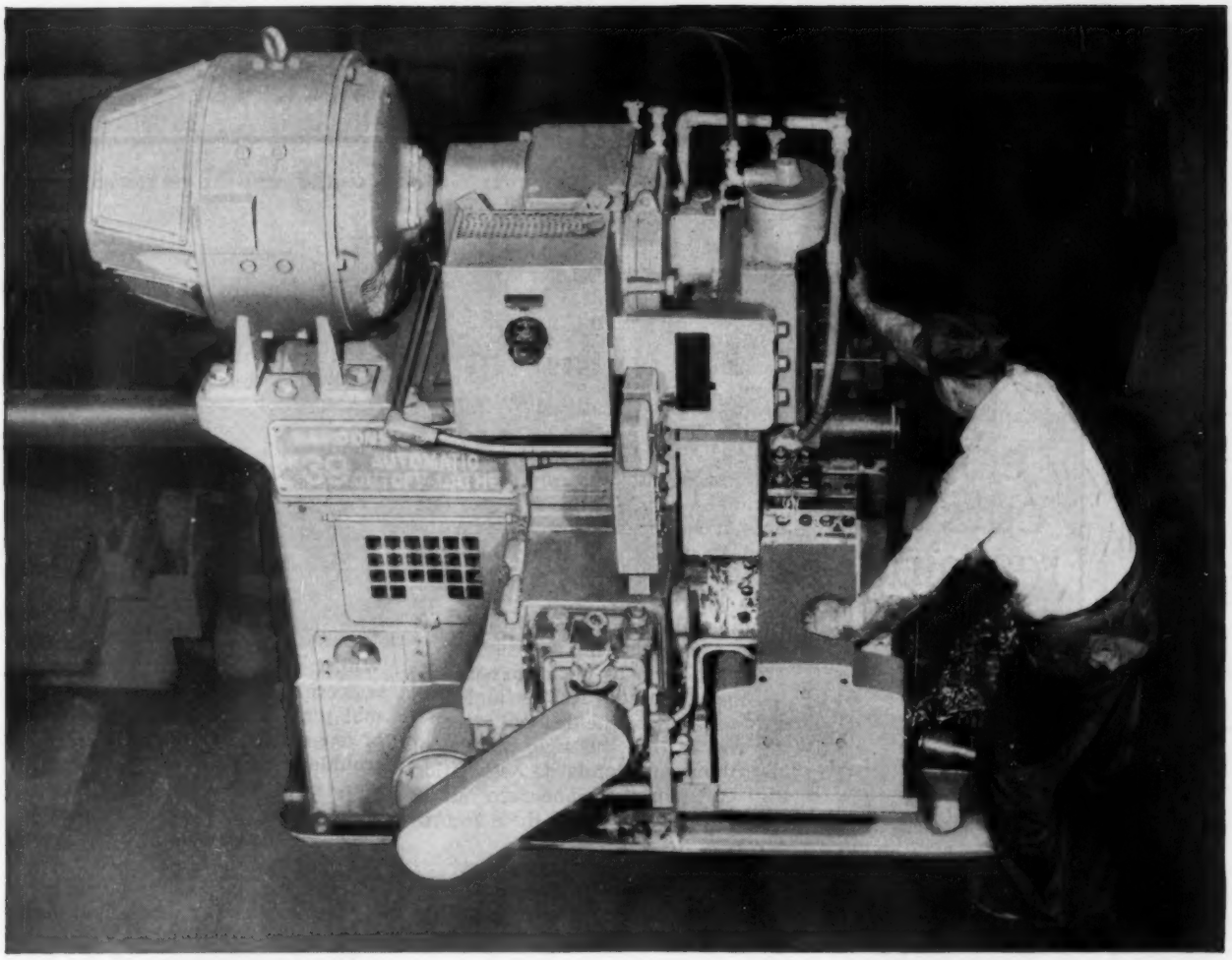
RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.



Photograph courtesy of The Colorado Fuel and Iron Corporation

"Excellent Performance . . . Very Low Maintenance Cost"

AT

THE COLORADO FUEL and IRON CORPORATION

The Superintendent of The Colorado Fuel and Iron Corporation's new Seamless Mill reports *excellent performance* and *very low maintenance* cost on their Bardons & Oliver Cutoff Lathes. At present, the mill has in operation four pairs of Bardons & Oliver Crop End Cutoff Lathes cropping pipe 2⅜" to 9⅝" diameter. Two other machines are used for cutting coupling stock from 3.063" to 9⅝" diameter.

Many of the leading pipe and tube mills have standardized exclusively on Bardons & Oliver Cutoff Lathes. Over 60 years of manufacturing experience is your assurance of quality machines for continuous operation and high rates of production. Send your blueprints to Bardons & Oliver engineers for individual attention without obligation.

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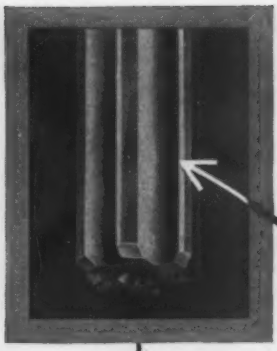

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Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Much Ado About Zero

I like that letter entitled "Talking of Tenths" by Lew Suverkrop (*AM*—May 23 '55, p94). My gripe has always been with that zero *before* the decimal point. What earthly purpose does it serve, except to add to the reader's problem of struggling with zeros?

As long as you are going to try running an article using the zeros after the decimal place set off in groups of three by means of commas, why not go a step further and drop that zero before the decimal place?

I realize that the style manual of the American Standards Association still calls for that lone zero out in front, and have written them accordingly.

Granger Davenport
Chief Engineer,
Gould & Eberhardt, Inc.
Irvington, NJ

Practical considerations dictate that the extra zero be used. When dimensions are printed, it is much safer to put a zero before the period, so if anything happens to the period there is some space between the zero and the first decimal place to indicate what the dimension should be. For some reason it also seems to have an effect on the printer. We have published articles in which we dropped the first zero, and found the printer wandering all over the lot, counting our zeros. Therefore we have used the zero, not because we wanted to, but because we felt it was necessary insurance against somebody making a mistake.—Ed.

Full Stop

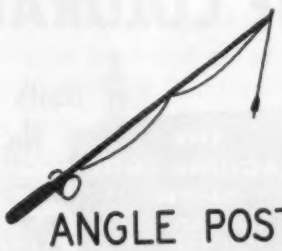
Whilst this argument is going on concerning the use of zeros and decimal places, may I take the liberty of suggesting that much of your trouble springs from the fact that you use a full stop (period — Ed.) rather than a decimal point. We place the decimal point half way up the height of the zero or other figure where it cannot possibly be mistaken for a full stop, and where it is easily seen.

The idea of pointing off the zeros with commas, in groups of three, is certainly worth considering, although it would cause some confusion on the Continent where they use a comma in place of a decimal

GRINETICS

By D G SMITH

BIRTH RATE



ANGLE POST

STUB-TOOTH

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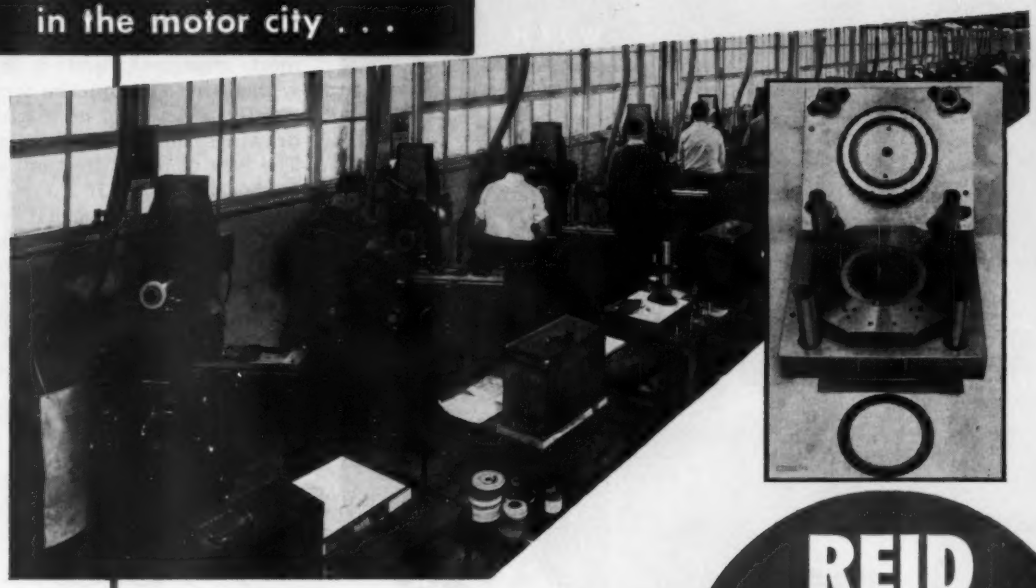
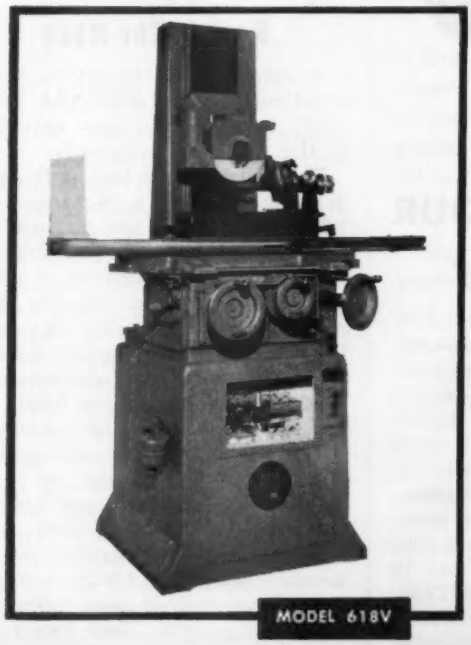
in the motor city . . .



REID GRINDERS set the STANDARD for ACCURACY



In Detroit, at Commando Tool and Die Co., positive accuracy is a must in grinding the high-production tooling necessary for today's automobile and aircraft production race. Commando and many other shops in the area have found that Reid Surface Grinders provide the built-in accuracy that spells top performance year after year.

You, too, can have the precision, the better surface finishes, the dependability and convenience of operation that are engineered into every Reid Grinder. So why not plan now to replace the over-age surface grinders in your plant with new Reid Grinders.

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WITH
BETTER MARKING
AT LOWER COST!

NOW...
NEW
DIAL FEED
MARKING
MACHINE

SPEED-MARKS 12,000 PIECES PER HOUR
...Automatically

Tooled for high production marking of small metal parts (12,000 pieces per hour), Model 347 illustrated above, is a good example of Noblewest's ability to keep ahead of industry's demands for constantly higher marking speeds at lower cost. Featuring a hopper and dial feed combination, parts are fed to the machine by the hopper, marked and automatically ejected. Spring pressure controls the depth of the mark and insures uniform depth of mark from piece to piece regardless of slight variations in diameter. Noblewest is equally famed for fine marking dies . . . made to the most exacting standards of quality and with the all-important skill and know-how of master craftsmen. Whatever your needs for marking, Noblewest makes the machines, tools and dies to do the job faster, better, at lower cost. For complete details write to Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.

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ORIGINATORS OF THE ROLL MARKING PROCESS
EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

point, which is even worse than your use of a full stop.

I notice that in *American Machinist* you stick to the use of a zero before the decimal point. This is most important, and it is to be wished that the practice were more strictly adhered to on all American drawings and in other magazines. The lack of it has frequently caused expensive errors. If a dimension is given as 0002 (the decimal point having been dropped by the printer), one is never quite sure whether it is meant for 0.002 or .0002. If the use of a zero before the decimal point were universally adopted, there could be no doubt that 0.002 was meant.

Oliver Broadbent
Coventry, England

Work to the Mean

In reference to the article, "Hole Relation Gages," (*AM*—June 20 '55 p147) I find I must take exception to the first few paragraphs.

The article states that if the part drawing showed a dimension of 1.5000 ± 0.005 as the distance between hole centers, the gage drawing would call for a dimension of 1.5000 ± 0.0005 (based on 10% for gage maker's tolerance). This, of course, is self-evident and logically correct. However, if the part dimension is 1.5000 plus 0.004, minus 0.000, the dimension would be 1.5020 ± 0.0002, not 1.5020 ± 0.0004 as shown. This is arrived at as follows:

1.5000 plus 0.004 minus 0.000 is equivalent to 1.5020 ± 0.002. 10% of 0.002 is 0.0002. Therefore the dimension would be 1.5020 ± 0.0002.

Hubert B Shenkin
Gage Engrg Div
Curtiss-Wright Corp
Wood-Ridge, NJ

We Goofed

In the second paragraph of the article on "Improved Planer Tools," (AM—May 23 '55, p117) we stated, " . . . carbide-tipped planing tools were more comparable, etc." This,

of course, should read, "were not comparable." Our apologies to the authors, and to any of our readers who were puzzled by this typographical error.—Ed.

Crazy But Good

In my long life I have seen a lot of crazy ideas that had no logical reason for working—but work they did. One of the craziest appeared as a Practical Idea (*AM*—June 6 '55, p168). Right after I read it, I was doing a polishing job with steel wool and got a lot of slivers in my fingers. You know how troublesome those slivers are—you can feel them but can't see them. So, feeling that it couldn't hurt to try, I got a piece of fresh emery cloth and gave a few light wipes over the prickly area. Presto! All the slivers disappeared. I don't know where Mr Sperman got the idea, but it is going to be a blessing to a lot of people.

Robert Fanning
New Brunswick, NJ

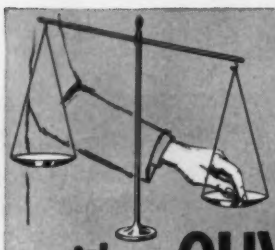
Locking the Door

I was very much interested in your article, "How to Control Production in a Job Shop" (*AM*—June 6 '55, p 134). This information should prove valuable to many small shop operators.

However, I noticed a common production planning weakness in the caption for the progress chart, p 136. It recommends placing an x at the estimated cost point on the chart; then goes on to state, "Crossing the estimate mark starts an investigation as to the reason for excessive cost."

This practice amounts to locking the barn after the horse is stolen. It is much more practical to set up units of man-hours to establish fractions of the total estimate. For a small job, requiring 50 to 100 hr, you might set up units of 10 man-hr each. Then, at the completion of each unit, you can check where you are against where you should be, and can even calculate how much an early delay will affect delivery date. In this way, action can be taken on excessive costs before the profit goes down the drain.

Robt Holroyd
Passaic, NJ



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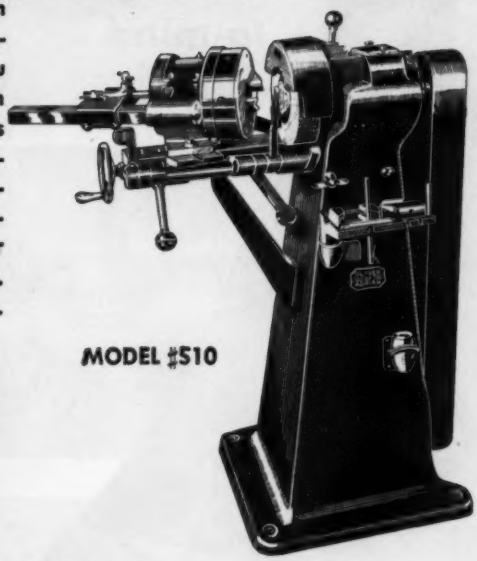
From almost the instant an OLIVER DRILL POINTER is installed in your toolroom, you will notice its effect upon many aspects of your plant's operations. Expensive automatic equipment will be protected . . . production schedules maintained . . . higher product output assured . . . and increased profits certain.



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Drills ground on an OLIVER DRILL POINTER last from 2 to 3 times longer than ordinary hand ground drills. Machine ground to a perfect balance, Oliver ground drills are scientifically correct and theoretically perfect—each lip of the drill performs equal work. Drills ground the Oliver Way cut faster and more accurately . . . produce more perfect holes.

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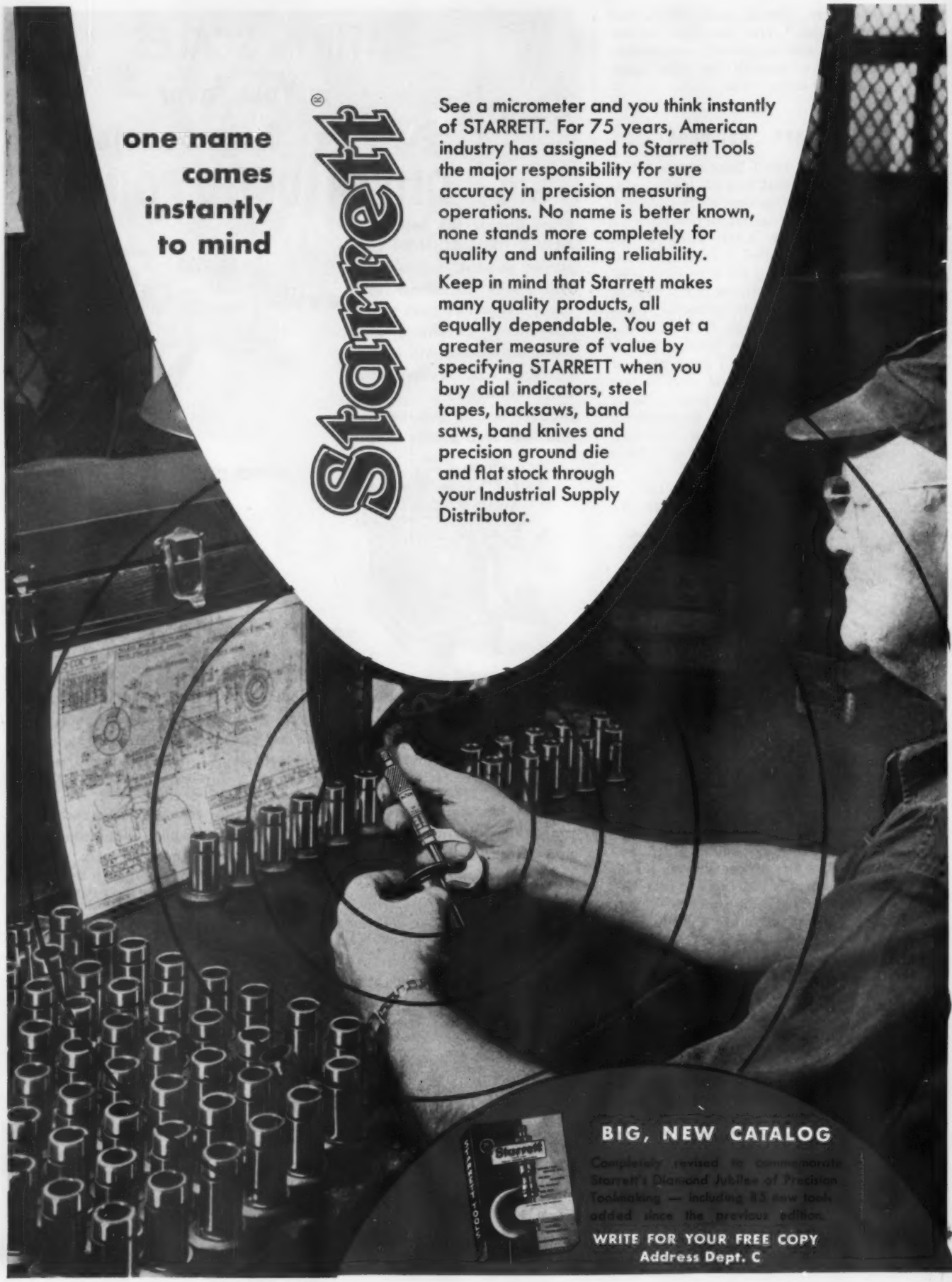
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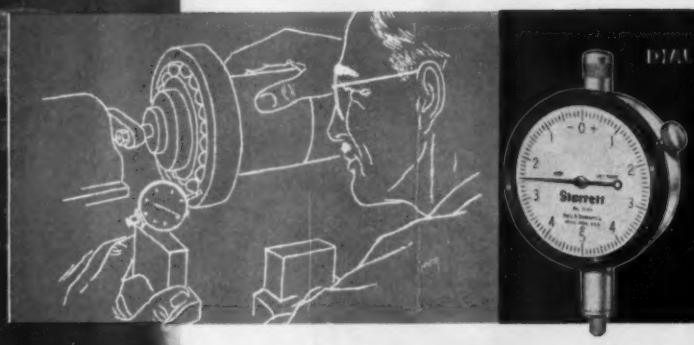

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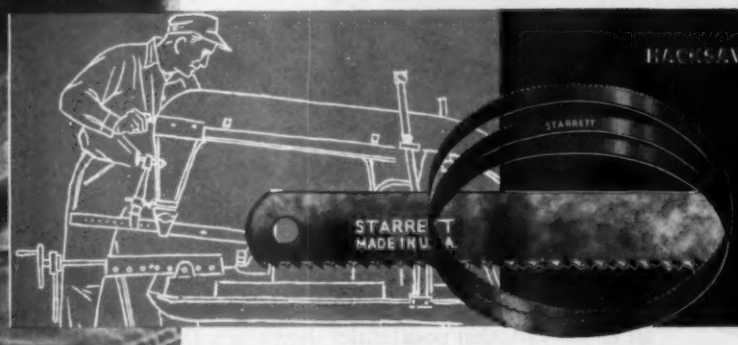
Standard for quality and precision — a complete line for every gaging or production inspection application.



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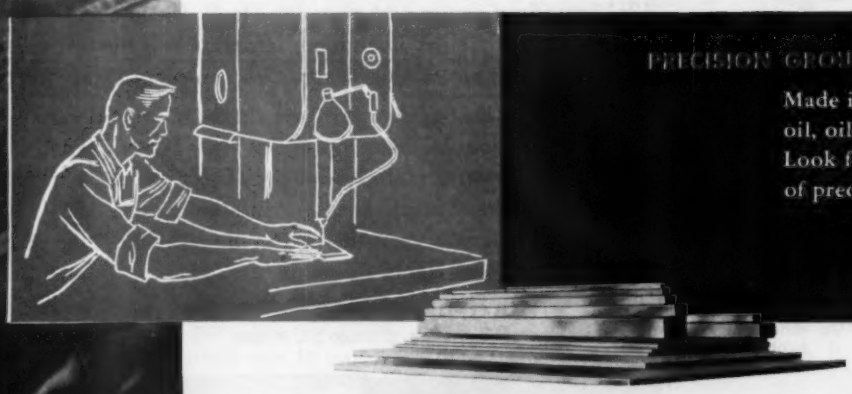

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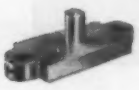
can you guess the number of different center post

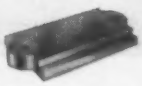
DANLY DIE SETS

in stock–in just one size ?

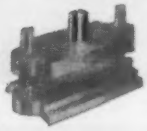
67 ? 575 ? 1433 ? 31,104 ?



3 different punch holder thicknesses

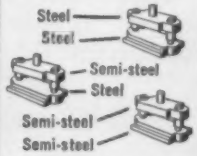


3 different die shoe thicknesses



6 shank size variations

4 bushing type variations



3 different material combinations

16 guide post lengths in each of 3 different styles to choose from

If you guessed 31,104 different standard center post Danly Die Sets in just one size . . . then you were right! Simply multiply together all of the variation possibilities shown in a Danly Catalog for a 12x12 standard center post precision Danly Die Set, and you'll get this remarkable figure. Even more remarkable is the fact that *all* of these variations are cataloged and *stocked* in every Danly Branch.

Just how does this benefit you? This almost unlimited variety of Standard Danly Die Sets in stock at your Danly Branch is your assurance that you can always get the die set you want . . . *when* you want it. That's important in saving tooling time. So remember, when you want the best in die sets—*fast*—the place to call is your local Danly Branch.

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DANLY

DIE SETS . . .
STANDARD OR SPECIAL
DIEMAKERS SUPPLIES

Spot News of Metalworking . . .

Some textile machinery manufacturers report they're getting cancellations of new machinery orders from Southern textile makers. Reason: just as the industry emerged from a two-year slump, the Geneva Trade Agreement lowered Japanese textile import duties as much as 50%. Now US textile makers have cancelled new equipment orders for fear of being undersold in domestic markets by Japanese goods.

Russia says its new jets are fast enough to crack the "heat barrier," the arbitrary 1600-mph speed at which presently known aircraft alloys burn up. The Moscow dispatch ambiguously adds that Russian aircraft engineers are "studying" new alloys that will hold up under those speeds.

Probably the broadest diversification move in Metalworking history is that of ACF-Brill Motors Co, Philadelphia bus builder, which has bought out a 50% interest in a chain of 60 Detroit area grocery supermarkets.

A turbine and turbine-gear program, involving purchase of $50-$65 million of machine tools for reserve mobilization purposes, is about to get the green light from ODM Administrator Flemming. Program embraces acquistion of a reserve of turbines and turbine gears, as well as of long lead-time machines for building turbines and gears. Senate Banking Committee has given the project its blessing. See p103.

Cleveland firms are recruiting skilled metalworking craftsmen from Canada, such as tool and diemakers, die sinkers, patternmakers, and machine repairmen, to overcome a critical shortage of skilled help caused by mushrooming Cleveland industrial expansion. (see p165)

Aluminum instead of steel for motor oil cans is being tried out by Reynolds Aluminum and Esso Standard. The aluminum cans cost more, but they save 6 lbs weight per case of oil — a big freight factor. And a southern firm has developed a can crusher to salvage aluminum cans, predicts that it will bring aluminum can prices down to less than those of steel eventually.

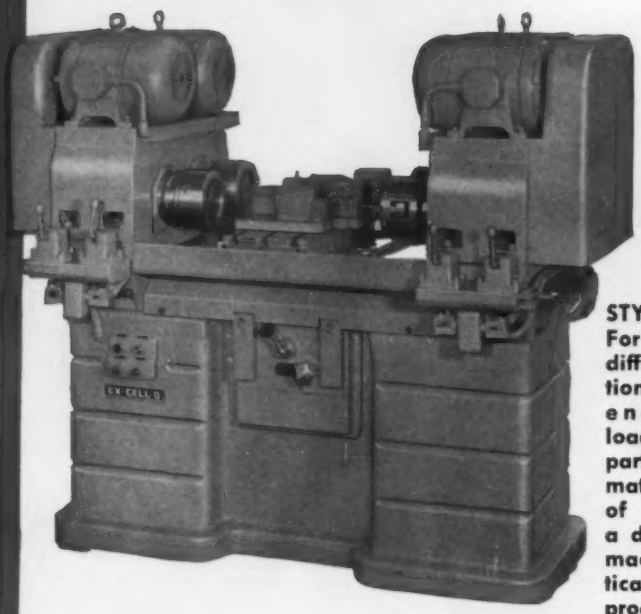
ODM has ruled fast amortization certificates aren't transferable when one firm is sold to another. The ruling came up when Babcock & Wilcox wanted to take over nine certificates totaling $4.8 million when it recently bought out Globe Steel Tubes Co, Milwaukee.

Federal government sales are taxable in the state of Arizona, that state's Corporation has ruled. AiResearch Mfg Co, electronics equipment maker, now not only has to pay a 2% state tax on its government sales, it may have to absorb taxes on 200 machine shops that have been supplying it with tax-free parts.

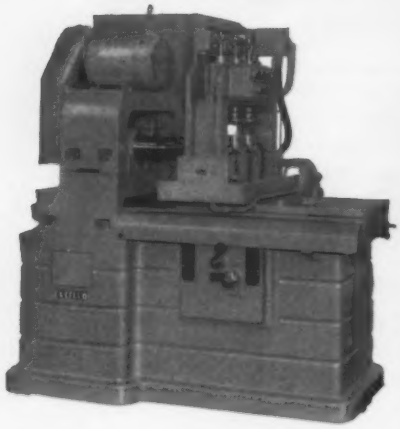
Italians have come up with a new aluminum building alloy for panels and walls that, like present building alloys, acquires a non-reflecting gray tint from oxidation, but also has a higher degree of density and mechanical resistance, requires no polishing for decorative effect, or expensive plating.

An entirely new solid-fuel rocket motor is now in use in recently developed guided missiles such as the Hughes Falcon. Because of the motor's tiny size, the Falcon and similar missiles can be launched from interceptor planes.

STYLE 2112-A. Single-end model for work pieces in the small and medium-size range. Flexible hydraulic controls give easy adjustment of multiple operations.



STYLE 1212-A. For identical or different operations at each end. When loading time of parts approximates the time of machining, a double-end machine practically doubles production.



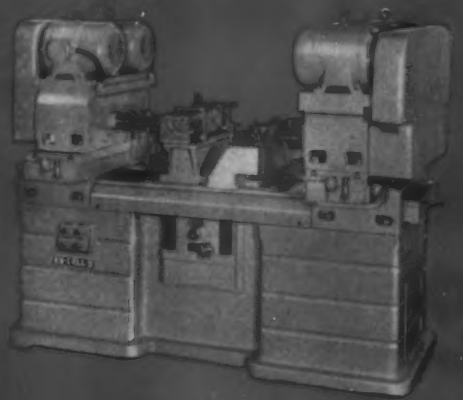
STYLE 112-C. Large and sturdy with long stroke. Accommodates medium and heavy work, gives maximum precision production, minimum operating cost.

WHICH MODEL FITS YOUR PRODUCTION?

Ex-Cell-O Precision Boring Machines

XLD

EX-CELL-O *for* PRECISION



STYLE 17. Massive construction. Maintains the highest precision standards on a profitable production basis. Economical in operation, can be tooled for a wide range of production jobs.

You can precision-bore, turn, face, counterbore, chamfer, or groove with these fast, sturdy, flexible EX-CELL-O machines.

These are standard machines that handle many kinds of precision operations. EX-CELL-O has the *standard items of tooling* to make this possible at minimum cost.

Any EX-CELL-O Precision Boring Machine will give you *precision work at maximum production* speeds, with a minimum of investment.

Get all the facts about them from your local Ex-Cell-O representative, or write for a Precision Boring Catalog.

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Washington . . .

Mobilization planning . . .

The pentagon's new "Register of Planned Mobilization Producers" comes out this month. This is the master list of industrial plants—mainly metalworking of one type or another—lined up to produce top-priority military goods in case of war. The Register is a revised version of the three-volume "Alphabetical Register of Planned Wartime Materiel Suppliers" which contained some 35,000 listings.

About 10,000 less plants are listed in the up-to-date Register. Those cut out include firms that have merged, changed product lines, gone out of business, or ones who have just failed to maintain contact with the Defense Dept's Industrial Mobilization Program.

If you want current military business, or if you want to sell to the military in the future, the register is a vital thing. Actually, the entire Register is a classified document. But you can check whether you are included in the Register and whether you are listed correctly—company name, plant locations, civilian products, planned military production, and the branch of service you're originally registered with.

Although you are registered with one branch, however, you are authorized to deal with others. In fact, this is one of the main reasons for the register—to inform the various branches what industrial facilities are available for mobilization planning.

You can check your entry in the mobilization producers' register with the "Armed Services Procurement Planning Officer" to whom your plant is assigned. If you are not sure who he is, check at any major military procurement office.

Government's business outlook . . .

Commerce Dept's midyear industry survey shows that new alltime highs will be reached in production and sales for 1955. Here are some official estimates:

● **Steel**—ingot output will come very close to the 1953 peak of 111.6-million tons. Some decline expected in third quarter, mostly for seasonal reasons. Shortages will remain in all flat rolled steel products and some tubular products.

● **Aluminum and copper** — aluminum shipments will set an alltime record of over 3.7 billion lbs, some 700 million lbs more than last year. Copper fabricating operations will be about 25% over 1954. But refined copper supplies will total only about 10% more than last year's second half.

● **Autos**—output will likely top 1950 record of 6,665,863 cars and be close to same year's high for trucks, 1,337,193. Replacement parts makers are "having one of their best years"—with volume of about $2 billion expected for the year.

● **Machine tools**—shipments for the year are expected to total $670 million, which compares with shipments totaling slightly over $1 billion last year.

● **Electronics**—production will likely reach $6.2 billion, just below the record $6.3 billion of 1953.

Government-aided plant expansion . . .

A behind-the-scenes Washington squabble is brewing over the government's Defense Plant Expansion Program. Some mobilization planners recommend additional fast tax writeoffs for new expansion in defense-supporting industries—notably steel, aluminum, petroleum refining.

Treasury Secretary Humphrey—who sits on the Defense Mobilization Board which will rule on the question—wants to cut back on rapid amortization, however. He thinks too much revenue is being lost while defense spending stays high and government budget-balancing becomes tougher.

The issue will be settled this summer. ODM is making a review of all the expansion goals now on the books. Before making a decision, the administration wants a new look at mobilization requirements and industrial capacity already in place.

More antitrust fireworks . . .

General Motors Corp is expected to figure in a big way in Congressional antitrust hearings during the summer. Democrats in both the House and Senate plan to resume their long series of hearings on antitrust problems after Congress quits for the summer; up to now the auto and steel industries have been getting most of the attention.

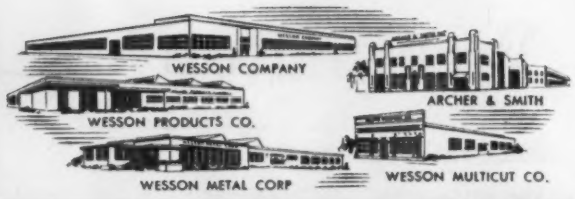
GMC ducked invitations to appear along with the five other automakers and the two steel companies during the antitrust hearings that just completed. Democrats, however, say they will "insist" that GM appear when hearings reopen.

With old-hand antitrust Congressmen running the show and Republican antitrust officials talking and acting as tough as any of their Democratic predecessors, the hearings will continue to generate plenty of heat—though probably not much that's conclusive.

Justice Dept spokesmen say they are watching for any "significant competitive changes" in the auto industry, but while hitting at prosecution of GMC for an alleged monopoly of bus manufacture, they obviously do not feel they have a case now against GM on a charge of monopolizing the passenger car field.

On steel, the Republican antitrusters practically invited Bethlehem Steel Corp and Youngstown Sheet & Tube Co to go ahead with their proposed merger, which the government says would violate the antitrust law. The antitrusters are eager to test the anti-merger law and will sue to prevent a steel merger when and if the two companies make definite commitments to each other.

carbide NEWS



New Wessonmetal "26" Boosts Tool Life 40%

Optimum performance of "nearly universal" grade extends over range of 100 to 400 sfm

Gains in tool life ranging up to 40% over other steel cutting grades are reported for Wesson Metal Corporation's new Grade 26. The new steel cutting carbide has consistently outperformed all other steel cutting grades in 95% of all machining operations on which it has been applied.

Indications now are that the new Grade will produce significant increases in tool life over approximately 80% of the entire steel machining range. While created primarily to handle all types of steel rough and semi-finish machining—light, medium and heavy duty—it also is proving highly effective on some finishing operations.

What is more, the new Wessonmetal grade is not limited to a narrow range of cutting speeds. Optimum performance for Grade 26 extends over a range of 100 to about 400 sfm, covering 95% of steel machining operations encountered in industry today.

Since Grade 26 is the closest approach to a "universal" carbide for steel cutting yet produced, it reduces the number of grades required for steel cutting operations by as many as four grades. Problems of grade selection are greatly simplified, therefore, by the new Wessonmetal grade.

Much of Grade 26's outstanding performance is due to its superior cutting edge strength. Particularly important at the elevated temperatures generated at high cutting speeds, are the carbide's inherently high red hardness combined with high thermal conductivity.

Grade 26 is now in full production at Wesson Metal Corporation's new metals plant in Lexington, Ky.

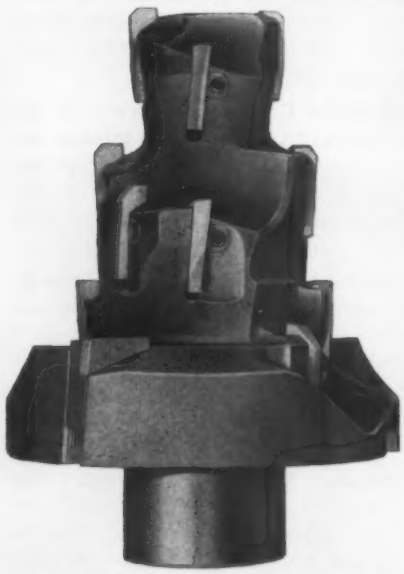
Tool life took a big jump on this severe interrupted cut on a forged steel tractor brake band anchor. Cutting speed ranges from 280 sfm down to zero. Feed is .027", depth of cut is ⅛".

Multi-Diameter Cutters Slash Tool and Machining Costs

Special eight-operation cutters designed by Wesson Company engineers permit a major builder of commercial air conditioning units to achieve a sizable reduction in the cost of machining compressors.

Solid Wessonmetal Grade GS blades are used on the cutters to produce 3600 cylinders per grind, compared with only 250 cylinders per grind previously. Grinding takes one-third as long as on tools previously used.

Although solid carbide blades are used on this operation, these special multi-diameter cutters are typical of the many other special Wesson designs incorporating standard blades which provide interchangeability of solid carbide, carbide tipped or HSS blades without modifying blade slots.



A total of eight chamfering, semifinishing, finish boring and facing operations are performed at each of five stations with these cutters on a W. F. & John Barnes boring machine.

tools Wesson carbide Wessonmetal

For answers to your machining problems write:

WESSON COMPANY, DEPT. AD, 1220 Woodward Heights Blvd., Detroit 20, Michigan

Detroit . . .

As an attention-getter . . .

. . . **and as a bargaining wedge,** automation served the United Auto Workers well during the GAW build-up. Jack Conway, administrative assistant to Walter Reuther, at one point summed up the UAW's attitude on automation: "Under our (GAW) plan, management would tend to avoid the introduction of automation when major layoffs would result."

UAW did not win its version of GAW, of course. It took Ford's plan — lock, stock and limited liability. It also took a licking where automation is concerned. The pro's and con's of the automation argument aside, it should be noted that the Ford formula for supplemental jobless pay will bear scarcely at all on the introduction of improved manufacturing processes.

Company liability under the plan is restricted simply to the setting aside of 5¢ per manhour worked. If a newly automated process should cause layoffs, the company is ahead momentarily because the "GAW" cost is reduced accordingly. Rather than slowing up the advance of technological improvements, Detroit's 1955 labor settlement doubtless accelerated it. Not that the labor union protest is dead. Automation is too good an emotional issue to be permitted to die.

Labor's steady push for security . . .

. . . **could be partly explained** by the recent experience of two independent auto makers. In early July, 1700 Studebaker workers were laid off "indefinitely." Reason: "installation of new work standards."

Translation: last year, the South Bend contract — then out of line competitively with the rest of the industry — was tightened up by mutual agreement. Studebaker is now getting more production out of fewer workers because some of the fat was trimmed off the union contract a year ago.

A month before the Studebaker cutback, American Motors cut its Milwaukee and Kenosha workforce from 19,204 to 15,804 — a layoff of 3400. Said AMC: auto production was reduced to a rate of 650 a day. Production prior to the layoff apparently had been averaging 750 or better a day. "This adjustment," AMC went on, "reflected a recent record production rate necessitated to build dealer inventories to a satisfactory level after an abnormally late production start in some models."

But whatever the reason, certainly the layoffs give pause for thought. In what almost assuredly will be the biggest year in auto history, with production and sales figures soaring far beyond even the most optimistic estimates, two of the smaller companies find themselves over-staffed by more than 5000 workers. That being the case this summer, how will the "Little Three" be doing next summer?

Though it's strictly academic now . . .

. . . **Chrysler's labor stand of two months ago** remains interesting. The corporation was prepared to resist two demands even though such resistance meant taking a most costly strike. Chrysler was undercut on both issues.

One was GAW, or any piece of it. The other, interestingly, was the full union shop. UAW's acceptance of Ford's offer gave GM and Chrysler no choice but to follow. GM's switch from its modified union shop clause to the full union shop left Chrysler no other choice but to buckle on that count, too.

While at first glance it does not seem possible that Chrysler would have risked a shutdown on the union shop issue alone in its crucial "recovery" year, qualified sources inside the company say Chrysler would definitely have gone to the mat with UAW, had GM not capitulated.

The hectic, harrowing marathons . . .

. . . **that labor and management bargaining teams often stage** as they come down to the wire on new contracts have appalled more than one onlooker. Why, one is apt to ask, can't the parties reach agreement in neat and orderly fashion, instead of resorting to round-the-clock sessions in the final days? After all, UAW, Ford and GM had five years between contract talks (excluding a brief reopening in 1953) in which to agree on new terms. But both parleys went to the wire, then a few hours beyond. Result: the sporadic strikes that followed cost GM production of over 50,000 cars and trucks while Ford lost about half that many.

Main reason for sticking it out to the bitter end is simply that it makes good collective bargaining sense. Neither side wants to reveal its final position until the past possible moment. To do otherwise is to leave the side open to challenge.

Another reason: union leadership wants to take a good story back to the members. By going all night, a union chief can tell members: "We took them right up to deadline. We got the last possible penny. If you want more, strike."

Michigan's jobless pay . . .

. . . **benefits were increased July 15** so that when Ford's supplemental jobless pay plan goes into effect next year, the drain on the Ford, GM and other trust funds will be lessened accordingly. At the same time, the increased state unemployment benefits will mean that employers will have to contribute more to the state fund. Previously, reserves were 7.5% of payrolls. Now they stand at 8.5%.

Under the new law, the maximum weekly benefit is $54. Previously, the rate was $42.

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HAMILTON VARIMATIC®
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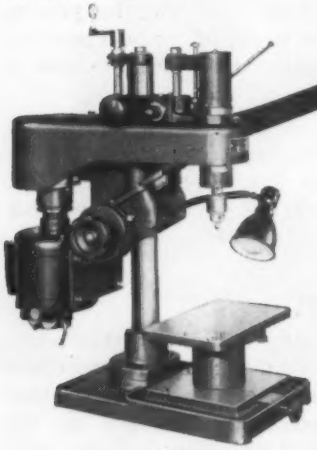

Are you fighting the never-ending battle of trying to produce exact holes on a drilling machine which, itself, is not built to precision tolerances? You are under no necessity to do so. For the difference in price between the cheapest bench type, small hole drilling machine and the Hamilton Varimatic is reckoned in pennies per day. And the Hamilton Varimatic (holes from .004" to 5/16" in all drillable materials) is *super sensitive*. Provides speeds, *infinitely variable*, between 840 R.P.M. and 9300 R.P.M. Is built to *precision tolerances*, and with the stamina to *retain* precision.

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IT'S A **Hamilton Tool**

USE IT WITH CONFIDENCE

Machine Tools . . .

Buick and Olds are big buyers . . .

Buick and Oldsmobile are the main sources for machine tool orders in the General Motors facilities expansion program. Pontiac is reported third on the list so far as expenditures are concerned.

The fact is that Buick placed huge orders for tools just as soon as General Motors made a settlement with the United Automobile Workers early in June. The exact sum spent is not known, but it ran into many millions.

Oldsmobile also acted with dispatch on such purchases as machines for its cylinder block and cylinder head lines.

What all GM divisions are after is delivery of machines with the least possible delay. The tools are not tied to 1957 models, for instance, but are simply to enlarge the capacity to build cars.

Ford also has been a big buyer of production equipment lately. And a lot of Ford business is pending.

June was top month in orders . . .

The windfall of orders from the automotive industry, mostly General Motors, is believed to have made June the top month for machine tool business this year.

One press builder is said to have booked $15 million of orders in June. A builder of special machine tools took orders in June equal to six months of normal business. In fact, June smashed all its records for a single month.

Air Force buys tools in Europe . . .

Some 45 radial drills for Air Force depot requirements have finally been awarded to European builders on a low-bid basis. The decision was made in the office of the Under-Secretary for Air. Bear in mind that these machines are for current needs and have nothing to do with any reserve program.

More than 50 duplex milling machines for Air Force depots are understood to have been placed with domestic builders.

The decision to buy abroad was arrived at reluctantly, but was strictly in conformity with the law. The European bid was much lower than US builders' prices.

What Washington will spend . . .

Reappraisal of the outlook for government spending for machine tools yields these facts:

$100 million, appropriated for fiscal 1955 and now carried over into fiscal 1956 starting on July 1, 1955, is now in the process of being spent.

It is conservatively estimated that $35-$40 million of that amount will have been obligated (orders placed) by the end of July.

An additional $100 million is "in the bag" for reserve machine tools in the form of an earmarked fund in Pentagon's fiscal 1956 budget.

Actual spending of this money is believed to be some distance away.

On top of the $200 million already mentioned, the turbine gear program, involving sums for machine tools variously put at $50 to $65 million, is regarded as a safe bet.

Beyond this point, with some $250 million or more accounted for, things seem to be pretty badly snarled.

Chances appear remote for favorable action on the so-called "elephant tool program." ODM is indisposed to do anything about financing it at this time. Moreover, its top people are unconvinced of the necessity for the program.

Turbine gear program to get the nod . . .

Defense Mobilizer Arthur Flemming probably will give the turbine gear components program the green light before the end of July or soon thereafter.

He intends to proceed with the use of Borrowing Authority funds to acquire reserve machine tools for this program despite opposition from his general counsel. His own ODM review board split 2-2 on the issue and thereby withheld its endorsement.

Dr Flemming, not to be discouraged, has appeared before two Senate committees in behalf of the program. The Senate banking committee has just given its blessing to "more intensive efforts to eliminate the remaining bottlenecks to achievement of productive capacity more nearly adequate for full mobilization."

Dr Flemming mentioned the program in his recent testimony before the House banking committee.

Machine tool orders growing out of the turbine gear program will be placed by the turbine gear makers who will use the machines in case of emergency.

General Electric, Westinghouse and Allis-Chalmers presumably will be on the list of turbine gear contractors and will do the machine tool buying. General Services Administration will do the financing.

Up to a total of $75 million will be set aside in ODM's budget for the turbine gear program in fiscal 1956 and 1957. Most of the money for machine tools won't be paid out until fiscal 1957 because deliveries won't begin until then. Tool builders, however, may get some progress payments in fiscal 1956.

BF

SNYDER–AUTOMATION

At Station 16, work piece is turned 90° and transferred to other rails without vibration or loss of precision locating.

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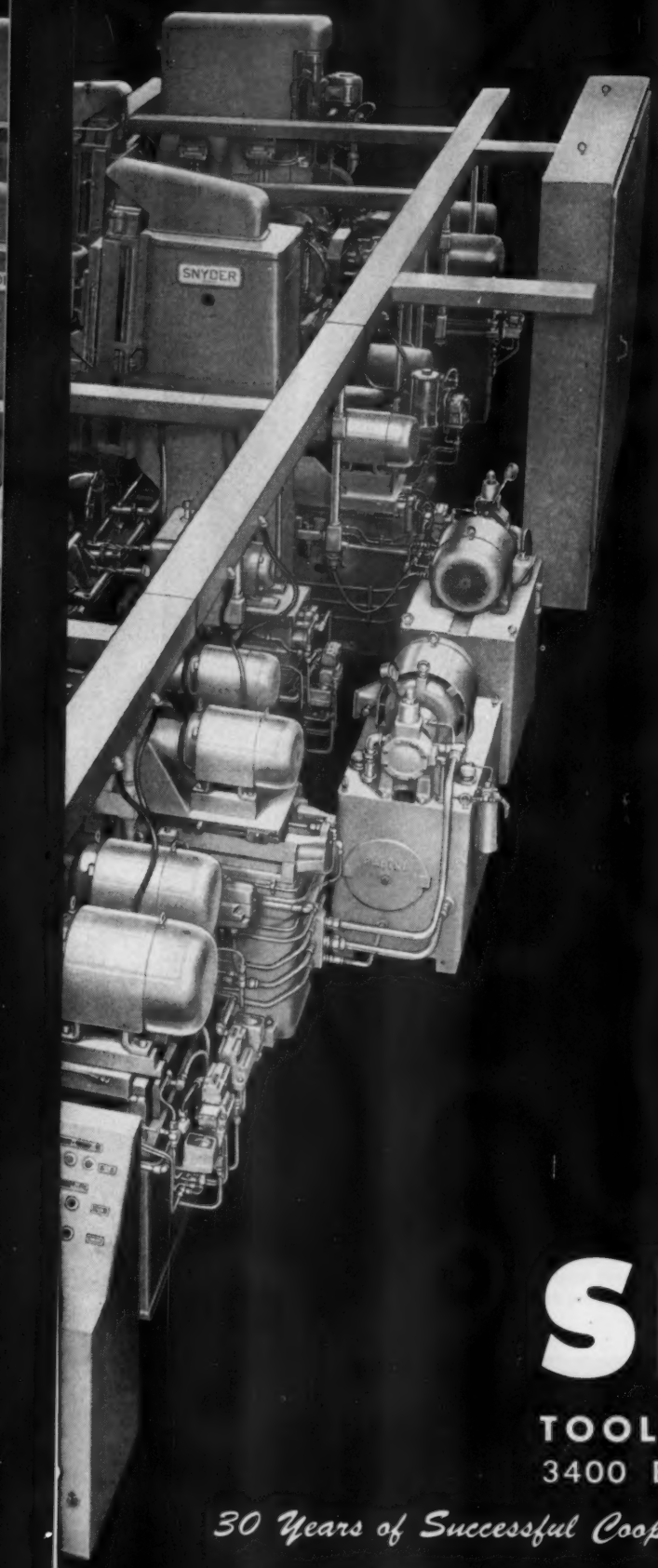

Presents

SNYDER SPECIAL

22-STATION automatic transfer machine for processing cast iron clutch housings; which drills, rough and finish bores, mills, saws, taps, spot-faces, counterbores and chamfers, performing a total of 110 operations on various surfaces or holes of various dimensions. Production, 124 cycles an hour at 80% efficiency.

UNUSUAL FEATURES: At Station 1, a 2" breather hole is trepanned from solid metal and finish bored with one tool. At Stations 8 and 9, a section of transfer rails cam-linked to milling units, drops to bring work piece into line with cutters. At Station 16, work piece is turned 90° and transferred to other rails without vibration or loss of precision locating.

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"*Texaco Cleartex Oil* has been in use in our plant for over eight years, with complete satisfaction. We have taken advantage of its dual-purpose ability and have used it both as a cutting coolant and a machine lubricant.

"The excellent performance of *Texaco Cleartex Oil* has been amply demonstrated. We highly recommend this product as a dual-purpose oil."

Texaco Cleartex Oil is one of a complete line of *Texaco Cutting, Grinding, Soluble and Hydraulic Oils* designed to help you do all your machining better, faster and at lower cost.

Let a Texaco Lubrication Engineer help you gain these benefits for your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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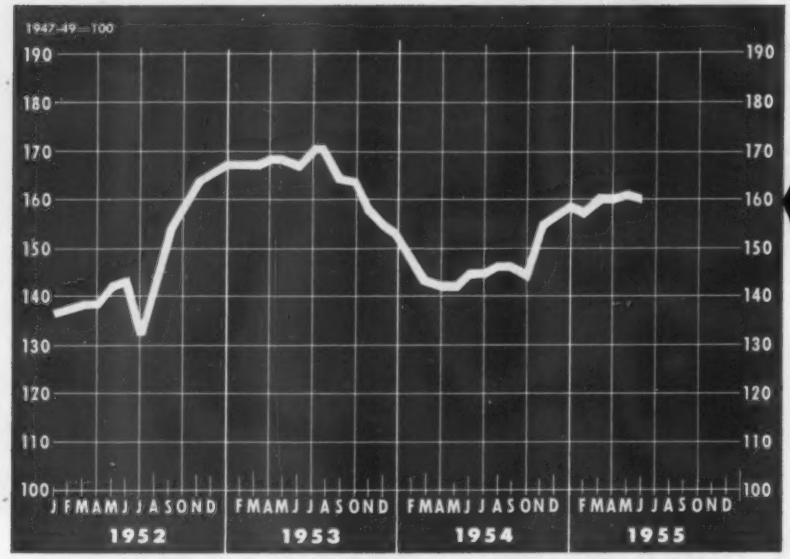
TUNE IN . . . TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on television . . . Saturday nights, NBC.

Gaging Metalworking . . .



Production Index

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	JUNE Estimated	MAY Preliminary	APR Revised	MAY Year Ago
Total index	**160**	**162**	**160**	**147**
Machinery		**132**	**130**	**124**
Electrical Machinery		**186**	**185**	**163**
Autos		**163**	**156**	**106**
Other Transportation		**262**	**272**	**296**
Other Metalworking		**135**	**132**	**124**

AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

Production keeps up stiff pace . . .

Though this is the most popular month for plant shutdowns for vacations, Metalworking is operating through July at an amazing pace.

If allowance is made for seasonal effects, production has been more than holding its own this month. And August looks good too.

Steel demand affords as good a clue as any to what metalworking companies think the future holds.

The tonnage of steel pouring out of mills is not expected to diminish the remainder of this year. If actual chewing up of steel should run a bit behind steel production, users will be content to do a little inventory building.

Seller's market exists in steel . . .

The search of many steel customers for mills with which to place fourth-quarter orders gives substance to the report that a seller's market rather than a buyer's market now holds.

Some steel buyers must shop around to place 400 tons for October-December delivery, and can get acceptance only from small mills.

This tightness in steel, which was not seriously aggravated by the very brief strike, indicates that the last half should be extremely active in metalworking as a whole.

Steel stampers feel good . . .

Steel stamping companies are said to be "chortling" over third and fourth quarter prospects. Automotive stamping business for the year is put at 75% above the 1954 level. Television and radio demands upon stampers will be up 50%, and household appliances 26%.

Stampers dependent upon the automotive industry are not looking for any drastic letdown in orders. **Most independent stamping plants** are working two shifts, with the average workweek at 42 hr.

Car assemblies to dip . . .

There is bound to be a lull in the frenzied production of automobiles, as the summer progresses and preparations are made for manufacture of 1956 models.

But changes in design will not be radical and the retooling period promises to be short.

A new all-time peak in passenger car and truck assemblies is likely to be attained this year.

Farm tractor production and sales were 20% better in the first half than in the comparable period a year ago. Another 10% step-up is anticipated the second half.

Demand good for electrical equipment . . .

Outlook for electrical equipment is the best in a year-and-a-half. Orders thus far in 1955 have been ahead of 1954, big increases being scored in power transmission and distribution equipment.

Outpouring of electronic products is likely to be within a shade of the record $6.3 billion in 1953.

In the first half, production of black and white TV receivers was 3.7 million units, a near-record.

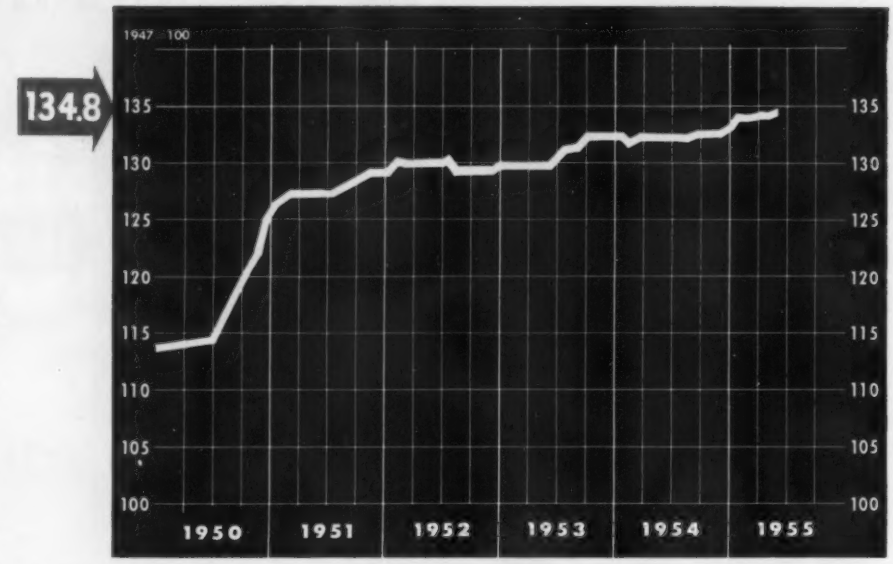
All kinds of construction machinery—crawler tractors, shovels, cranes, heavy rollers, motor graders — are well above the 1954 level. And no letdown is expected in the last half.

Rescheduling of production of certain types of military planes should keep the aviation industry's workers busy all year. Civil aircraft output should show a gain of about 30% over last year.

Gaging Business . . .

Price Index

	JUNE Estimated	MAY Preliminary	APR Revised	MAY Year Ago
Total Index	**134.8**	**134.6**	**134.5**	**132.4**
Metalworking Machinery	**148.6**	**146.4**	**141.6**	
Other Machinery exc. Electrical	**139.3**	**139.2**	**137.5**	
Electrical Machinery	**131.7**	**131.6**	**130.1**	
Fabricated Metal Products	**130.8**	**130.8**	**128.7**	



AMERICAN MACHINIST INDEX OF METALWORKING PRICES

Boom is in "happiness phase" . . .

The boom in business has now reached what one observer describes as the "happiness phase."

This is the phase in which businessmen are happy about sales because they are increasing and about costs because they have not yet increased very much.

There is a strong suspicion, however, that before 1955 is over, business will have entered the "worriness" phase in which management complains more and more about rising costs.

Best six months in history . . .

A poll of economists reveals their belief that the boom will last for all of 1955. The political stage, in which it will become increasingly difficult to tell what the actual state of the economy may be, will begin next year.

All forecasters assume there will be strenuous efforts to assure a rising business trend, as well as a rising political thermometer, well into 1956.

During the next six months, business sales and profits, employment and personal incomes probably will be the highest in history, in the economists' opinion.

Corporate profits, after taxes, are expected to reach $21 billion for the full year 1955 (18% more than in 1954). About $11 billion will be paid in divdends to stockholders, the hghest total on record.

Profit margins narrowing . . .

In manufacturing alone, total profits for 1955 may be as much as $13.5 billion. That would be an increase of 20% over 1954. These figures assume that profit margins in the second half-year will be narrowed somewhat by higher costs for labor and raw materials.

Construction materials output is at an all-time high. Glass, cement and clay products are 5% to 15% above previous peaks.

Only industrial and farm construction, of all major types of construction, are off so far this year. The outlook the next six months is excellent.

The value of construction put in place in 1955 will top $42 billion, compared with only $37.6 billion in 1954. Commercial construction is expected to do better the last half of the year than the first half.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	143.6	143.5	125.2
Steel ingot production (thousand tons)	2,164	1,716	1,430
Electric power output (million Kilowatt hours)	10,138	10,226	8,825
Production of automobiles and trucks	195,034	191,890	133,141
Engineering construction awards (*Eng. News-Record*, millions)	$378.9	$439.1	$298.5

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	N.A.	364	282
Vacuum cleaners sales (thousands of units)	261	244	202
Washers sales (thousands of units)	342	313	247
Household electric ranges sales (thousands of units)	N.A.	109	83
Radio production (thousands of units)	1,114	1,160	722
Television production (thousands of units)	467	583	396
Gear sales index (1947-49 = 100)	205.2	179.8	134.3
Foundry equipment new orders index (shipments, 1947-49 = 100)	145.7	178.6	80.8

*Seasonally adjusted
N.A. not available

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Tapered hole in head insures concentricity and a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking, due to cutting portion wearing undersize and creating negative relief. Performance retains all advantages of standard, expensive reamer. Backed by T-J's 38 years of know-how as one of largest manufacturers of die sinking milling cutters.

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- *It can be formed without flaking of the coating*
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American Machinist

MAGAZINE OF METALWORKING PRODUCTION * ESTABLISHED 1877

New Urge to Cut Costs

The cost pattern with which you as a metalworking manufacturer must live for the next year is now laid out for everyone to see. It is not a pleasing sight.

The cost of your workers' time will be more, to begin with. Whether you elect to follow the Ford formula, or think it better to put the extra money right into the pay envelopes, you can count on paying higher hourly rates to your men.

More than that, as you look ahead, you cannot possibly come to any other conclusion than that **the price of labor will head inexorably upward. You will have to deal promptly and efficiently and continuously with that element of cost to prevent it from eating you out of house and home.**

Beyond the added labor cost is the rising price of raw materials. This trend became discernible some time ago, but has been accelerated recently by an average boost of $7.50 a ton in steel. Another reminder of the trend is copper, which is 20% higher today than it was a year ago.

Thus you are not destined to have an easy time of it. If you could blandly pass along these stiff hikes in cost to your customers in the form of higher prices, that would be one thing. But can you do that with assurance that you will be able to hold onto your present volume of work? The answer depends heavily upon what your competitor intends to do; and you certainly can't predict accurately his actions. It also depends upon the exact point at which the consumer decides that he will forego a purchase rather than pay more for a product that he wants.

It is, then, clearly a time to probe into your operations with an eye on cutting costs wherever possible. It is not a job for any one person but a task in which every management man should participate, from general manager down to and including foremen.

Easy times unfortunately breed relaxation and inefficiencies. Extra costs sometimes are passed over lightly, or are ignored, when dollar intake is big and business is booming. Prosperity has the effect of letting one's guard down.

"Sane men do not deliberately steer for rocks which they know are there," as one observer puts it. "The trouble comes when they forget the presence of the rocks."

That is why it is all-important now, while mounting costs are just beginning to be felt, to do something about keeping them within reason instead of acting as though they don't exist.

A sensible first step is to plan a campaign to make your entire organization cost-conscious. If you don't keep costs down, you will be imperiling your volume of business and your profits. When profits shrink sizably, unpleasant things are bound to happen in any company.

You should take a close look at a lot of things. What is your production per manhour? Is it lower than it was, is it the same, or is it higher? If it isn't higher, you certainly should do something about it.

Are you still using machines designed before World War II or are you taking advantage of the power, flexibility, higher cutting feeds and speeds, and automation available in machines of 1955 design? Have you streamlined the flow of materials and parts in process through your shop, employing mechanical devices to do the lifting, tugging and hauling?

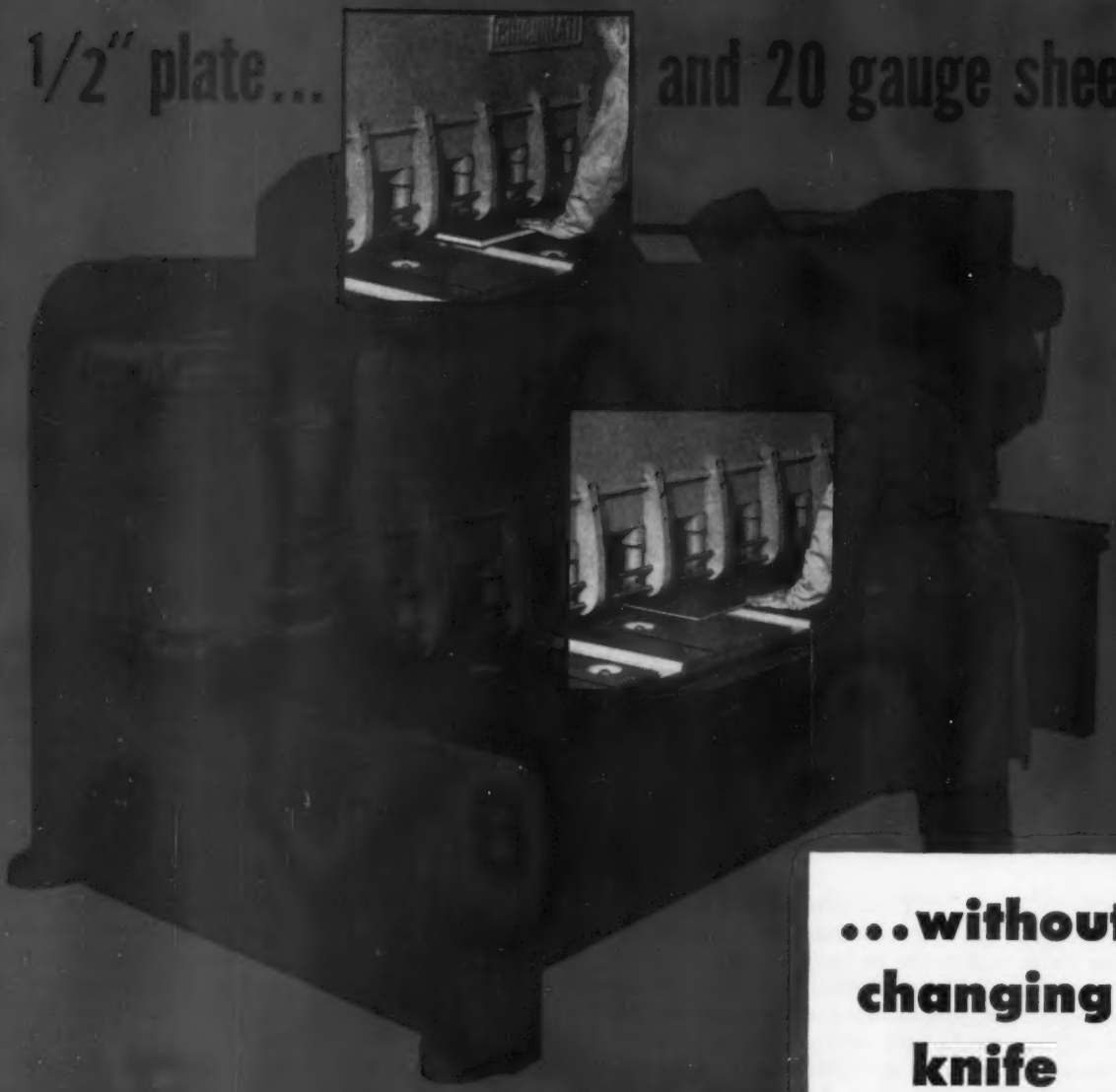
These are only a few of the pertinent questions that you should attempt to answer for yourself. And everyone in any position of authority in your company should have a part in answering them.

Getting your costs down and keeping them down will do more than almost anything else to help stabilize our economy, and your business in particular, in the face of advancing labor and material costs.

Burnham Finney

CINCINNATI accurately shears

1/2" plate... and 20 gauge sheets



...without changing knife clearance

... You do not change knife clearance for successful shearing of different thicknesses on a Cincinnati. Just set the clearance for the thinnest material and shear all thicknesses up to capacity. Thousands of Cincinnati Shears are used continuously in this manner. This practical method prevents accidental damage — saves time. Remember, changing knife clearance interrupts production.

Sharp knives are a necessity for satisfactory shearing, especially on very light gauges. Remember, changing knife clearance does not sharpen dull knives. We suggest you write for data sheet on knife life.

Write for Catalog S-6 . . . describing Cincinnati Shears.

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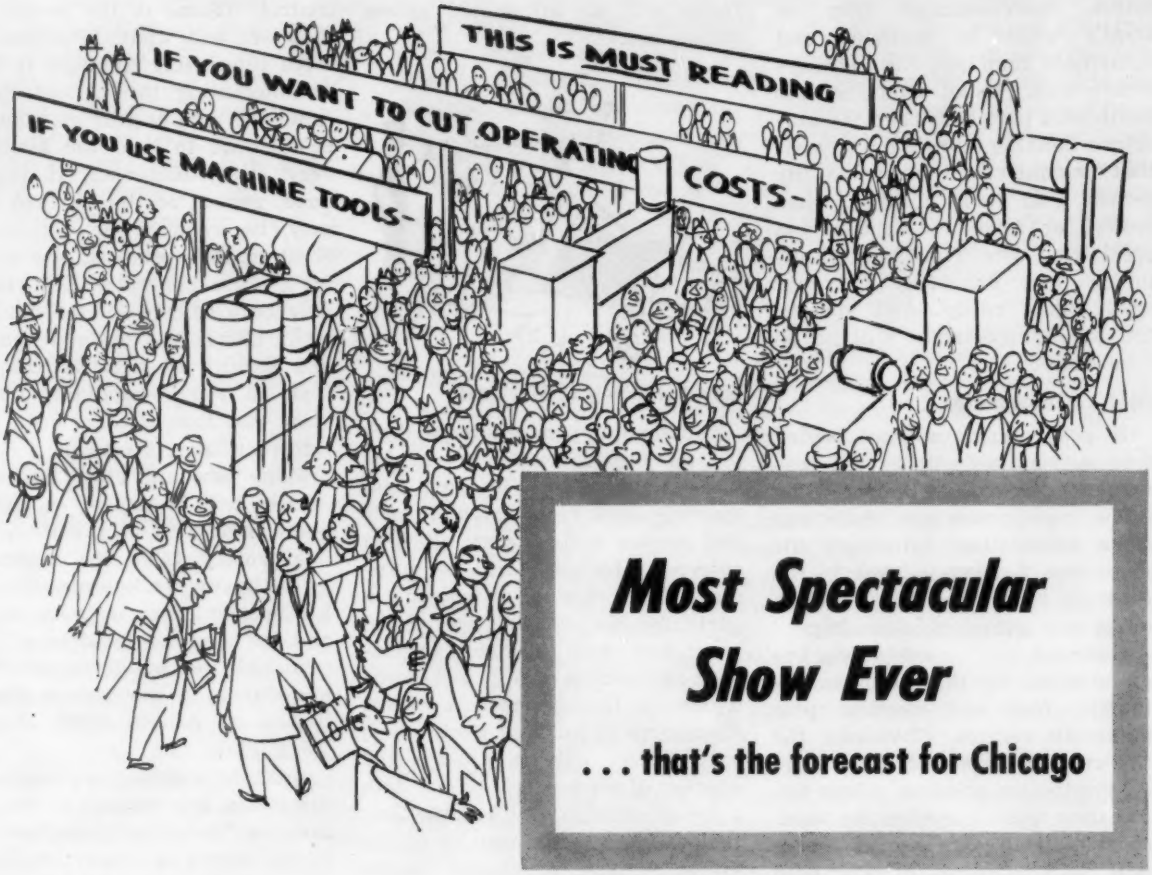


Most Spectacular Show Ever

. . . that's the forecast for Chicago

Peeks at machines still classed as "top secret" by builders, as well as appraisal of newly designed machines already announced, confirm belief that you will see the greatest Machine Tool Show in history at Chicago in September. These past eight years have brought more innovations than the 80 years before

E J TANGERMAN, executive editor

Startlingly new principles in the art of cutting and forming metal will share the spotlight with refinements of familiar units at the Chicago show in September. Recent emphasis on feedback or self-resetting, numerical control (principally tape-operated units), optics, and automation (particulary automation!) will be in evidence, to make this the most spectacular show ever. But there will also be higher powers, feeds and speeds; better-grouped, more-convenient, and more-positive controls; greater versatility, higher capacity, and other refinements on familiar units.

Press builders will be there, too, for the first time, and there will be three shows instead of one—both factors adding much greater variety and breadth than ever before. Many of the ideas to be shown have already been described in our pages, but many more are yet to come. (The old technique was to keep deep, dark secrets until the Show itself; this seems to be yielding to the idea of announcing radical departures beforehand, thus giving potential visitors a preview and advance suggestions for specific Show visits. This will permit you to make most effective use of your time in Chicago, yet there will be plenty of new things to add interest.) Everything is aimed at cutting fabricating costs—be it utterly automatic operation or greater rigidity and precision.

You have undoubtedly already heard something about self-resetting machines, tape-controlled units, computers, contour-following types, push-button-operated setups, auto cycling, and automatic handling that will be top Show features. Any of these is unique enough it should be worth going miles to see.

These may not, of course, be for you. But there are also the machines with larger chip areas, longer beds, wider tables, longer strokes, higher speeds and the like that will meet your current needs. Chicago in September will give you a

better, more-rounded idea of what's what in methods and equipment than you can get anywhere else. Usual effort on the exhibitor's part is to have the machines running, turning out parts that demonstrate their versatility rather than their abilities when tooled for some spectacular, but specialized, job. Thus you can appraise their suitability for your work fairly easily. And makers' top tooling specialists will be on hand to help.

First . . . Automation

It goes almost without saying that automation will be the feature of the Show. At the preceding Show, eight years ago, there was some automation (although the word was not yet in use) in the form of magazine feeds, ejection units, and automatic clamping.

But now . . . . . *everybody* has automation! By this we mean automatic feed and ejection, plus automatic control. Obviously, the self-resetting machines must have it. Production grinders, where automation really preceded the word, consider it almost essential. There will be a crankpin grinder with transfer units, internals completely automated (some possibly tied in with other machines), surface grinders and others.

There will be lathes. One for armature turning is accurate to 0.0005 in. and turns up to 7000 rpm, completing a ⅜-in. cut in 11 sec. Another is a 60-in. unit that changes from rough to semi-finish to finish tools automatically, also cycles automatically. Another features flexible loading so a wide variety of work can be handled without major change. Still another combines automation with tracer control, for jet-engine-part turning.

Automated gear machines will be shown in several booths, some combining three or four machines in a line. (Several are from a rather fabulous automotive pinion line not thus far described, but to be announced shortly. Several makers have duplicated their contribution to this line for exhibit.) Hobbers, shapers, shavers, and other operations will be shown, together with automatic inspection and automation between machines. There will be automated spline rolling too.

Care & Feeding of Machines

Outstanding progress made during the past several years in devices for feeding, locating and ejecting work from machine tools and presses will be very much in evidence. Included will be automatic feeds capable of handling a particular odd-shaped part in an exact way, with interlocks to prevent misfeeding of any sort, feeds which also inspect or check critical dimensions or surfaces, feeds which will deliver only a pre-selected number of workpieces, or maintain a pre-selected supply, and the like. Included are feeds, usually of the vibratory type, which can handle parts of peculiar shape or those (such as small gears) likely to tangle or catch. Far more exact locating elements, new chucks or other clamping devices designed to avoid distortion of fragile or soft parts, and odd drives, will be shown. An example of the latter is a magnetic drive and chuck combination for centerless internal grinders, in which the magnets hold a circular part against carbide-tipped shoes by driving slightly off center.

There will, of course, be ejecting units involving checking or inspection elements or classifiers so reject parts are not passed on to subsequent operations.

Gaging Is the Boss

Gaging has become a control process in its own right rather than a post-machining process. We have had gaging machines and automatic gaging for years, and each year brings more complex ones. But now the gage is becoming an integral part of the machine, and its results are more and more frequently being applied in machine control. (Some of the results are discussed later under "Feedback.")

An interesting sidelight is that, in automating thread and spline rollers, as well as gear machines, it is essential to hold the blank to very close tolerances. If this is done, gaging of the finished part may be reduced or eliminated. Some modern processes are so exact in normal operation that results may be predicted—if the blank is right. This means automatic gaging and sorting of a fairly complex type on rough-machining operations that have always been considered relatively crude.

Many new and close inspection devices will be shown—a case in point being a 48-in. precision vertical rotary table for inspecting large, heavy workpieces. The table vernier reads to 2 sec of arc, and the head is rotated by a ¾-hp reversible motor. Other new types are shown in our recent Special Report on Allison (*AM*, May 23 '55, p 133).

Another unusual application of inspection is a variant of the now familiar "receiving inspection." It is still receiving inspection, but it is automatic and built into a machine tool, particularly one performing a close-tolerance or expensive operation. It is applied to reject outsize pieces that would ruin tools, throw out close settings or simply add more processing cost to a piece that is already scrap.

Feedback and Self-resetting—Modern Magic

"Feedback" is the pet word of the electronics and control boys, but it means essentially that some information is fed back to maintain control of the machine. The ordinary steam-engine governor is an early feedback device. The principle was first applied in 1931 to machine tools, when one builder produced a primitive self-resetting internal grinder. Cylindrical grinders began to appear with automatic gaging during the war years. About 1½ years ago, an automatic lathe setup was announced, in which a gaging unit checked a finished camshaft and shut the machine down when tolerances were exceeded. It even indicated by light which dimension was faulty.

Now, at least four lathes have

been designed not only to gage the part, but also to reset or even change to tools. (The first was described in *AM*, Mar 14 '55, p 117). There are also self-resetting boring machines (*AM*, Apr 11 '55 p 168), hobbers (*AM*, June 6 '55, p 121), and centerless grinders.

Also being heard is "feed forward"—meaning a gaging or similar operation that passes information ahead to another machine or later operation. This enables presetting or preparation for a piece that varies within reasonable limits from the norm, so tools or other elements are not damaged and/or the piece is not scrapped.

Now Quality Control Works

Quite important in the new role of inspection is the fact that a quality-control principle comes of age at the same time. For years, the engineering department has set machining tolerances. If they were too close, they cost too much to maintain, and/or the shop couldn't maintain them. Sometimes equipment was no longer up to it (sometimes it never had been!), sometimes the operator wasn't, and sometimes all was well because gaging equipment wasn't good enough to be relied on anyhow.

Then quality control became popular. We dropped from 100% inspection to sampling inspection, applied probability curves, began to predict tool and machine wear by trends in size. Now this concept has been used in automatic resetting on at least two new machines. The sensible tolerances for the machine, based on its probability curve, are set as the limit before adjustment. One, two, or three pieces (*your* choice) outside these limits, and the tool is reset to correct. Meanwhile, the wider engineering tolerances are *not* exceeded (except by a real abnormality), so the machine produces little or no scrap. Secondary sorting or classifying elements in the gaging equipment take care of this situation and sidetrack the "sport" piece (borrowed from animal husbandry to mean the odd out-of-tolerance piece) to rework or scrap, as required.

Here, then is a significant change—tolerances based on machine capability, *inside* the permissible tolerances on the drawing. The shop, not the engineering dept, sets the tolerances. Accuracy of the modern inspection and control equipment is limited only by the inherent accuracy of the machine itself. And another significant change—time for machine repair or replacement can be predicted and specified by the inspection equipment!

Pre-selecting Is Spreading

As early as 1938, the Germans had pre-selecting controls on radial drills, but the idea has never caught on here. Various systems have been tested, found not too satisfactory. Now, however, one maker has succeeded in adapting a German design, so it can be incorporated to replace standard shift-level units in the same head (*AM*, June 6 '55, p 190). Thus the pre-selecting unit can be offered as an alternate in the same machine. Also made available at the same time is a programming console, so up to 20 feed-speed combinations can be provided in sequence at the push of a button. Another radial, incidentally, has so accurate a feed-screw on the arm that it can be set to "tenths."

Pre-selection on the other machine tools, particularly lathes, is growing. Several lathe makers will show designs incorporating the principle. At least one planer-type miller will also use the idea, and a grinder or two. One new jig borer has dials that pre-set the table to four decimal places—thus eliminating measuring rods. It is almost time to combine pre-selection with feedback to produce a machine tool capable of testing its own incoming workpiece and setting optimum feed and speed for machining that particular piece. Here is a way to assure uniform finish or dimension regardless of metallurgical condition, within reasonable limits! (And maybe we can maintain tolerances close enough to replace selective fitting with true interchangeability.)

Closely allied is the machinability computer recently announced. It doesn't seem unreasonable to apply this unit, in modified form, directly to control. Known factors could be set up in the circuit, and the unknowns worked out for each piece in turn. The resulting feed and speed could be set on the machine instead of read on dials.

Contours Are Important

It would be the understatement of the year to say that contour machining has "caught on." Lathes, millers, shapers, grinders, boring mills—practically every production-machine type—is now available with tracer equipment. Some are built in; some are attachments. It is a safe bet, however, that a wide variety of tracer, contouring, or duplicating devices will be on machine tools at the Show. Many improvements have been made re-

cently to permit closer tracing of difficult shapes. Styli may be actual-contact or spark-tracing types; actuation may be by various means. The general effort has been, however, to make tracing faster, with fewer limitations on right-angle turns and the like. A great amount of tracing and duplicating are being done in the field, so these exhibits will generate much interest.

Jet aircraft have given a major impetus to contouring—requiring large circular intricately formed shapes. There should be some of this big-swing, low-power equipment on display. The original maker of multi-tool contouring lathes has a new tracer machine with automatic controls, running at much higher speeds, with greater flexibility and added complications. But the complications increase productivity. Also, better chip and work handling are provided.

One new 40-hp lathe of this type, a 15 x 40-in. unit capable of 93 to 1164 rpm, already in service, has automatic clamping and tailstock setting, as well as all operations. There is a simple, foolproof, 2-position, power-indexed toolblock so tools can be changed automatically between auto-cycled roughing and finishing cuts. All controls are in a box extending the headstock about 4 ft.

"Brain Boxes" Go to Work

How many tape, film, or card-controlled machine tools will be shown is anybody's guess. At least two turret lathes, an engine lathe, a jig borer, a miller or two, a gear shaper, precision boring machines, punch presses, riveters, and a skin miller are already operating. Such machines as planer-type millers and horizontal boring machines are coming. There are also at least two systems of numerical control in which a series of table positions can be set up by punching buttons or turning dials. They will thereafter repeat as often as desired because of a built-in "memory" in the "brain box"—probably a series of bias cells. A jig borer with tape or punch-card control will set automatically to 0.0001 in., and in 15 seconds. Under development is one in which spindle and cutter are also numerically controlled. Only the control unit for the table will be shown in Chicago.

We hope to describe some of the newer ideas in this area before the Chicago Shows, to supplement our basic Special Report of last October (*AM*, Oct 25, '54, p 133), and earlier news stories on the subject.

Throw It Away

The concept of replacing instead of repairing that began in the radio and appliance industries some years ago has been given major impetus by recent developments in automated assembly. It's easier and cheaper to bend or twist an ear, stake a lug, or roll a ring than to use screws or rivets, so more and more small assemblies are made that way. If they fail, they cannot be repaired; they are simply replaced.

The same idea has grown like wildfire on carbide-tipped tools. First there were the clamp types of holders to avoid brazing problems; now we have a wide variety of holders that clamp a wafer or small block that is used until dull, then discarded. Early ones had square or triangular wafers, to provide four or three cutting edges on each side. Then toolholders were modified to incorporate cutting angles, and the wafers became square-edged—usable as received from the maker. Now, even good-sized cylindrical toolbits are designed for small-increment rotary indexing (3° index), and are never resharpened. And the latest is a milling cutter with powder-iron body and high-hardness carbide blades sintered together, instead of clamped or brazed. The cutter is used as finished, without regrinding, and is thrown out when dull (*AM*, June 6 '55, p 128).

Next Step: Assembly

Several authorities have told us recently that the next big "push" will be toward automation of assembly. There have been indications of it in reports of machines being designed or built for Detroit, the electrical industry, business machines, but most persistently in electronics. Here components are small, easily fed to an assembly, and joined by mass soldering, electronic or induction brazing.

About three years ago, hand soldering was replaced by dip soldering of an entire TV or radio chassis. The next year, etched wiring—previously used on missiles and radar circuits—was adopted. Now we have mechanized assembly.

The machine, producing 20 radar assemblies a minute, recently sold by General Mills to IBM, is soon to be duplicated for radio assemblies; several other makers are also producing commercial assembly units (United Shoe, ACF). Cost per purchased 30 to 40-station machine is $125,000 to $150,000. But Admiral, for example, has built three automatic assemblers, has four under construction, uses etched wiring, has cut 425 hand-soldered connections out of a TV receiver, now does 75% of assembly by machine. Human errors have dropped 99%. This has enabled a cut in price on a 24-in. console model from $500 to $340. The assembly line has dropped from 125 to 30 workers, but Admiral still employs the 10,000 or so people it did a year ago—and skill, man for man, is higher.

The same reasoning is being applied on other quantity production items—electrical switches and similar components, automotive subassemblies, typewriter and business-machine components. A number of machines now under development actually combine machining and/or forming operations with assembly. Bolting, riveting, screw fastening and hand welding are yielding to staking, crimping, roll-locking, adhesives, multiple spot-welding, lug-bending or twisting, and similar high-speed processes.

One press at the Show will be set up for piercing printed-circuit

boards, punching holes at 30 to 120 hits per minute. A multi-slide machine will show a tapping unit, handling piercing, extruding, and tapping of a 6-32 hole in a paintbrush ferrule at 175 per min.

Bigger and Better

Familiar standard machines will of course constitute the greatest number shown, but many of their elements will be new—hence unfamiliar—and will set a new higher standard. Horsepower, speeds, feeds, and rigidity are still going up. In millers, for example, one line will have knees 2 in. wider, over-arms about 10 in. longer, and beefier columns. Another will also have longer overarm, a small crane to carry the vertical head out of the way, other refinements. There's a light-duty universal that feeds both ways, to permit backfacing at speeds to 1500 rpm. One type has eight speeds of 50 to 1500 or 100 to 3000 rpm.

One new universal planer will cut on both forward and reverse stroke—or will double-cut rough and finish-plane simultaneously. Here is the end of the non-productive return stroke, an idea bandied about for years but unused, as far as we are aware, except by locking a zero-clearance double-edged tool so its own spring provides clearance on cuts both ways. This one actually sets the tools for cutting angle, and can run at 400 fpm.

The unit-head idea used on drills and lathes for some years is now appearing in boring, permitting a machine in which holes may be bored in several directions at once —like a way drill with slides.

A maker of automatic lathes will show a heavily electronic single-spindle machine with electrical turret and four cammed slides. Another 6-spindle double-indexing machine will have hydraulic actuation—brand new.

Change in clutch type on one line of radial drills permits push-button control.

Several lathe makers have cut operator fatigue and responsibility by power-actuation of former manual elements, provision of preselection, and simplification and grouping of controls.

Standard?

To call familiar machine types "standard" is to understate badly. These are new standards, generally higher than familiar ones. Happily for us, many of the ideas that readers said they wanted at the time of our 75th Anniversary Issue (Mid-November, 1952) are now being incorporated, making our 3-year old predictions come true.

One of the major ones is improved automatic-cycle programming, even for short-run setups, so cost-reduction possibilities of automatic machines can be achieved on most setups, even without highly skilled operators. As one shopman puts it: "We must soon be able to bring an unskilled man off the street and train him within a couple of weeks to run the most complicated production machine." New designs for lathes, skin mills, screw machines, millers, and others are already in the category—not requiring the large investments for numerical control nor the complicated engineering, yet sound for short runs.

Another improvement long in demand is better chip disposal, both in terms of adequate space and removal devices and in elimination of points at which chips hang up in present models—ways, toolposts, and the like. The fact is that modern production feeds and speeds produce chips at such high rates that major redesign is necessary to clear them. Conveyors can be built in and work effectively on finely broken chips (brass, CI, curled steel), but greater clearance and fewer projections are essential for clearing long, stringy chips. Some makers are solving this latter problem by putting all controls and slides above or behind the work, so the chips fall clear, others are using other devices, but the steps are in the right direction.

Built-in inspection is another broadly applied principle, with or without feedback. Lubrication, hydraulic actuation (with manifolds replacing tubing in some cases), simplified electronics, cemented plastic ways, greater rigidity, broader feed and speed ranges (and increase in infinite adjustability), powered rams and indexing, reduced operator fatigue and strain, easier loading and unloading, more-positive control—all these ideas appear in machines being readied. Several have built-in hoists, an outstanding example being a large horizontal boring, drilling, and milling machine with 1-ton electric hoist on an overarm. This machine also has optical measurement.

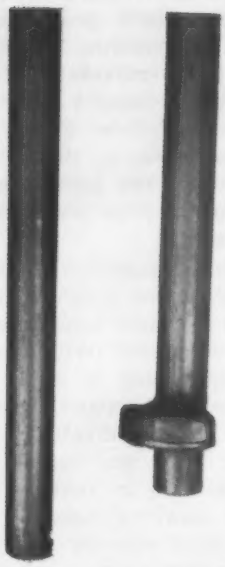
All in all, we can sum up as we began by saying that this Show will be both spectacular and solid, with eight years of accelerating present-day study lavished on redesigns and new developments. This preview "peek" convinces us —and should convince you—that more new developments have been made in these eight years than in eighty years before.

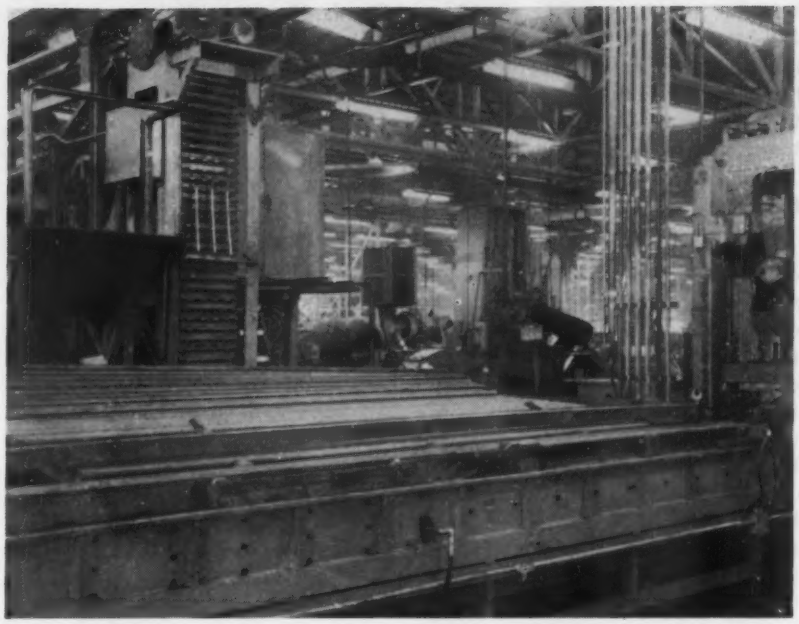
CHICAGO SHOW ISSUE

of American Machinist

Coming August 29

Here, with its hundreds of photos and descriptions of the new machines to be shown in Chicago . . . complete floor plans of the shows included . . . is your ideal guide to "what to see" . . . and the next best thing to "being there" if you are not going to Chicago in September. A big Special Report, too, on Metalworking's plans for new production equipment purchases. WATCH FOR THIS GREAT ISSUE.



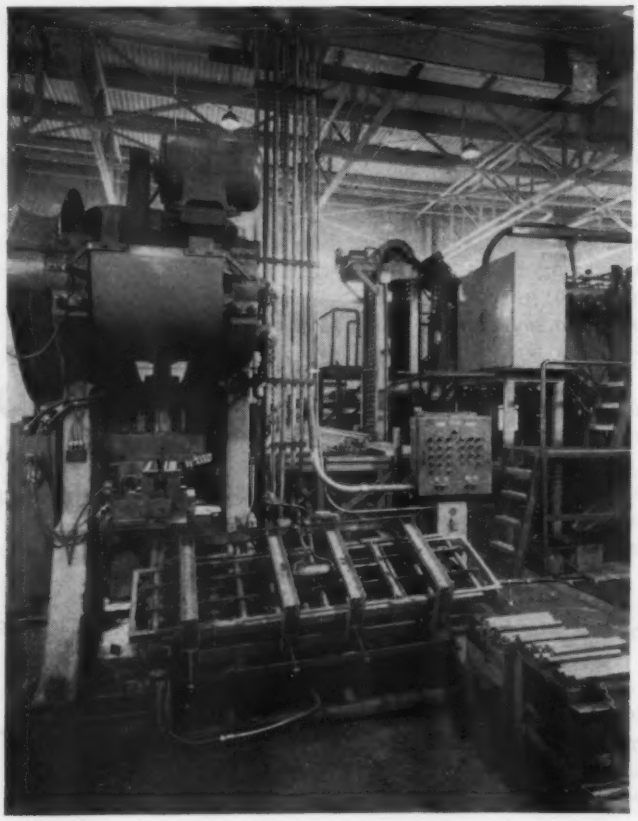


AUTOMATIC FORGING of pitman-shaft gear blanks is started at a stock rack where SAE 6120 bars 1¼-in. in dia by 14 ft long are dropped, one at a time, into the shuttle feeder in the foreground for delivery to a shearing die in a punch press. Bars are sheared to various lengths for different models, some being cut to 14-in. lengths, others to 9½-in. through an adjustable stop set to control their position in the press. Feed to the press and the cut-off operation is controlled to prevent overloading the system by means of a limit-switch circuit at induction coils where the bars are heated

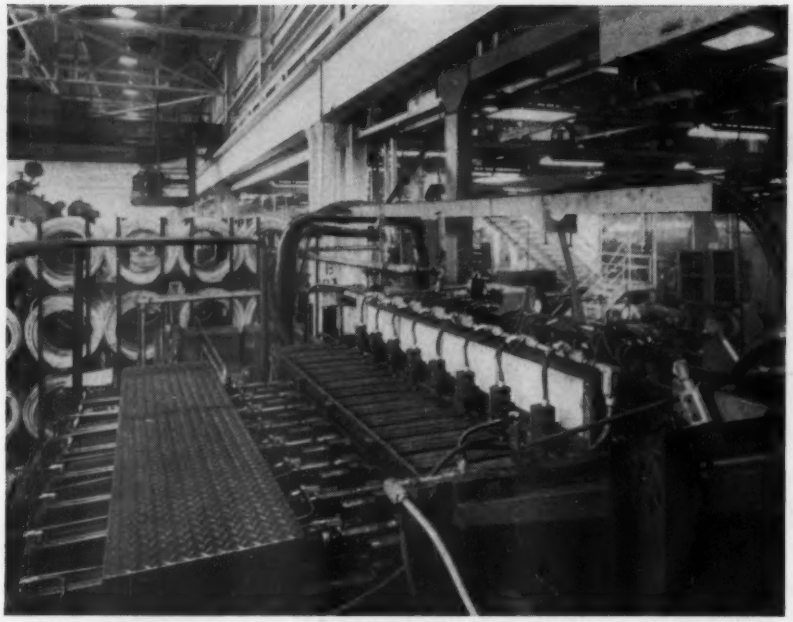
Automatic forging is

One operator turns out over 1000 forged pitman shafts per hour at Saginaw Steering Gear Div, General Motors Corp. The entire operation is automatic—from shearing bar stock to length, through heating, upsetting a gear segment on one end, to ejection. Here are pictures of setups

GEORGE H DE GROAT associate editor

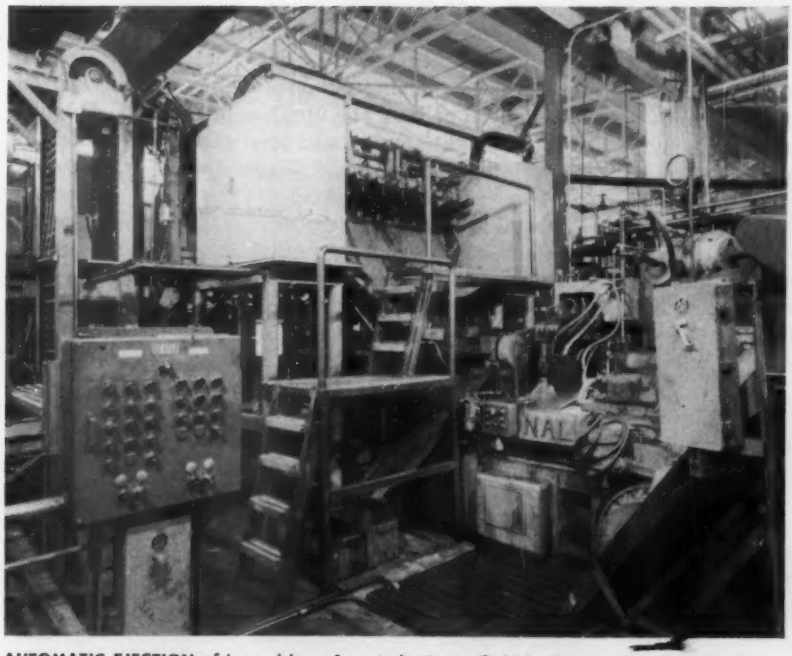


AUTOMATICALLY OPERATED PRESS ejects sheared bars into a shuttle that feeds a belt conveyor (right foreground). Bars feed through the die, contact a pivot arm that actuates a limit switch for controlling the press ram. The feed shuttle has a track slightly wider than sheared-bar length, receives bars from a V-shaped chute in front of the die. Pickup dogs on the sutttle advance a bar from one end to the other where they drop into the conveyor in about six indexes. A stationary cam pickoff at the end of the conveyor pushes the bars into flights carried around on a vertical elevator, from which they are loaded into an automatic feeder at the top of the induction-heating unit (right background)



INDUCTION COILS ARE LOADED by means of hydraulic cylinders that push bars from nests into which they are loaded by an automatic feeder. Timing of the individual pushers is controlled by the speed of the upsetter itself. Eight coils are provided with ceramic liners that support the bars during a 27-sec soaking cycle while heat permeates the bars to the center. Proper temperature for the following automatic forging operation is important—bars must be between 2000 and 2200F

fast, simple



AUTOMATIC EJECTION of heated bars from induction coils kicks them into a chute leading to a segregating device. Here a pyrometer checks temperatures—those overheated are rejected, those underheated are cooled and returned to the coils for reheating. Bars of the correct temperature are automatically loaded into a 3-in. upsetter. After a rack segment is upset on one end, they are ejected into a flight conveyor under the machine for transfer to large tote pans

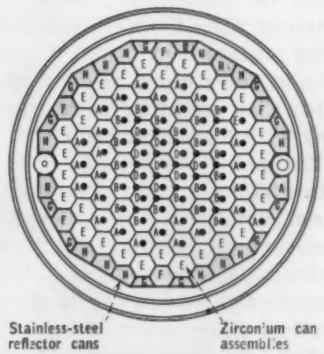
Zirconium "cans" formed and welded

Sheet zirconium is being fabricated and assembled into 10-ft-long hexagonal and near-hexagonal "cans" for a prototype nuclear heat reactor at Santa Susana, Calif. As reported by R L Olson of North American Aviation, Inc, Downey, Calif, in *Nucleonics*, June '55, p70, about 8000 lb will be needed.

First step is blanking 0.035-in. sheet into panels 124 in. long by 6½ in. wide. Profile dies in the power brake that forms them are heavier than normal, because zirconium acts something like stainless when bent. Formed sections, each with a "corner" in the middle so six make up a full hex can, are clamped in stress-relieving fixtures and heated to 1040F for 15 min, then permitted to cool in air. Blasting with fine alumina removes the slight oxide.

Next, edges to be welded are planed to dimension, using an alloy tool with 3° clearance and 67° lip angle. Cutting speed is 40 fpm. Then edges are lightly buffed with emery cloth and wiped with acetone on absorbent tissue. Sections are butt-welded with 3/32-in. tungsten electrode tapered to point, in argon atmopshere. The power-driven welding head moves at 4 ipm; parts are air-clamped. Welding current is 40 amp, dc, at 10 v; after higher starting high-frequency current strikes arc.

The zirconium cans enclose moderator-reflector units, which consist of central sodium-fuel channels with graphite tubes.



COMPLETE ZIRCONIUM CAN is made up of six formed sections, which are dimpled to make room for liquid-sodium overflow, in case reactor heats up and warps can. 86 Zr cans go inside 33 stainless ones

Machining layouts printed on plastic or metal

Fast and economical for small-lot production, this method permits laying out lines which will not smear or wash off and can be repeated exactly. Time is about one-quarter of that required for laying out with index head of milling machine

EDITH M DAVIES, BERT GREENE, A A RICHTER, and P J FRANKLIN,
DIAMOND ORDNANCE FUZE LABORATORIES, WASHINGTON, DC

Catacomb-type electronic-component holders, or chassis-blocks, usually contain numerous vari-sized catacombs or cavities located unsymmetrically over their surfaces. Preparation required intricate machining, and necessitated use of the index head on a milling machine to locate points.

To eliminate these disadvantages, photographic processes have been developed commercially for the preparation of metal templets. These are generally of two types: (1) a combination camera-projector projects the pattern to exact dimensions onto sensitized templet stock, and (2) drawings prepared on special glass cloth make contact prints on the sensitized stock. However, neither method is suitable for placing a pattern on plastic surfaces which may be attacked by many sensitizers and developers.

The process developed at Diamond Fuze Laboratories is somewhat similar to the second of the commercial photographic processes, but is particularly applicable to plastics and will work equally well on metal templet stock.

APPLYING THE PATTERN

The surface of a block is first roughened slightly to permit good adherence of the enamel used to apply the pattern. For metal templets, the surface obtained when the piece is faced on a lathe to obtain a flat surface is sufficiently rough, but with plastic, such as polystyrene, the surface obtained on a lathe is too slick and must be roughened slightly by rubbing with No. 100 emery cloth.

The metal or plastic block is fastened securely to a turntable, or other spinning device, and the prepared surface covered with cold-top enamel, a water emulsion of shellac sensitized with potassium dichromate. It is spun at 250 to 300 rpm until the enameled surface is dry to the touch. If the block is too bulky or heavy to spin, the enamel may be flowed over the surface and the excess removed by draining from one edge. The spinning method is preferred, however, because it gives a more uniform coating. These operations must be conducted in the dark because the enamel is sensitive to light.

The negative for applying the pattern is made from a drawing 3 or 4 times the desired size and reduced to the final size. It may be either on film or glass, depending upon the number of times it is to be used. On short-term usage, film shrinkage associated with exposure to heat and changes in humidity is not detectable but, on long-term usage, this change may be as great as 0.5%. When made on glass, the negative can be used continuously with no measurable change in the dimensions of the pattern and no detectable error in locating positions.

The emulsion side of the negative is placed against the dry sensitized surface and held in place with a piece of clear glass; this cover glass is necessary only when using a film negative. The surface is exposed through the negative to ultraviolet rays. Exposure time varies, depending on thickness of sensitized film, length of time the film has been dried, distance from the light source, and strength of the source of ultraviolet rays. Usual exposure is 4 to 5 min at 6 in. from a reflector sun lamp of 275 w. The exposed material is placed in the developer, primarily a solution of methyl violet in methyl alcohol, and agitated gently until the image, dyed a deep purple by the methyl violet, stands out well from the background. The plate is then washed under a gentle stream of tepid water to remove all unexposed areas and leave a clear sharp pattern.

In some cases, during the washing process, the pattern may wash away also, usually because the exposure time was too short, and in such cases exposure time must be adjusted. However, if the pattern washes away even after adjusting the exposure time, this indicates that the surface of the material was too smooth for adherence of the enamel and should be rubbed with emery cloth to roughen it. If none of the background washes off, exposure was too long, the emulsion was dried too long, or the developer is exhausted. When only a faint background remains, it can be removed with a quick rinse in methyl alcohol, followed immediately by another rinse in tepid water.

After drying at room temperature, the plate is re-

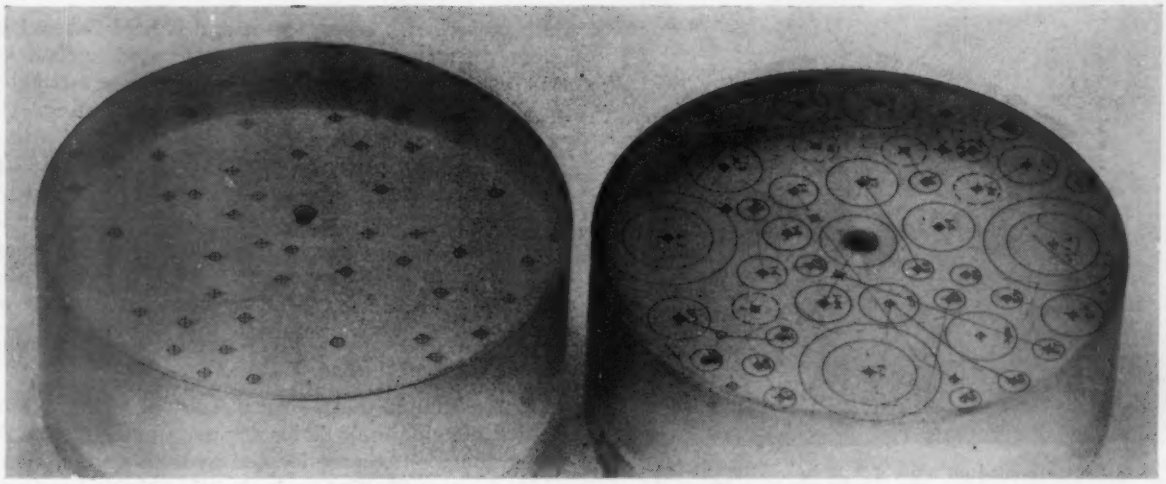


FIG. 1 .. Machine-shop patterns on polystyrene disks. LH pattern shows drilling centers only; RH pattern indicates drilling centers, dimensions of cavities to be drilled, types of components to be inserted, and connections between components. This prevents mistakes during assembly

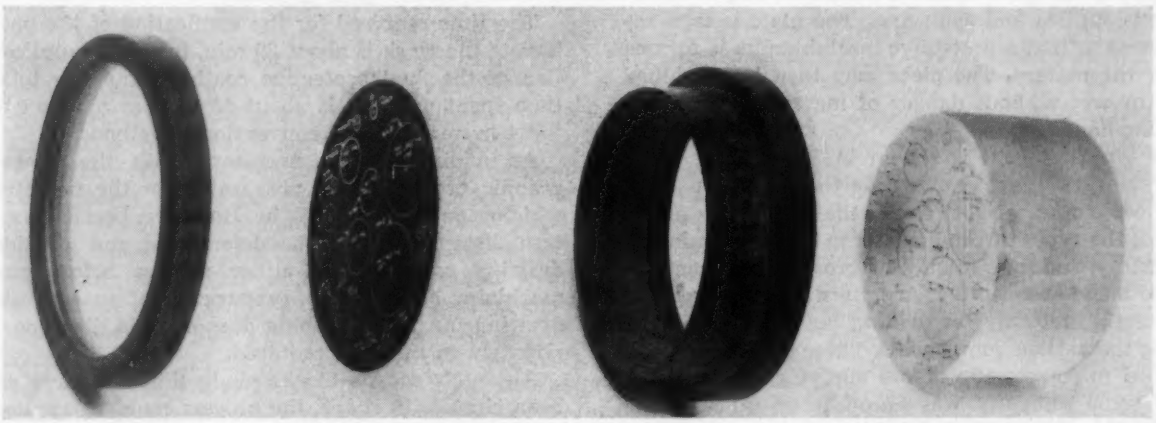


FIG. 2 .. Exploded view of holding fixture, left to right: negative-centering holder with plastic window, negative, block-centering holder, and printed block

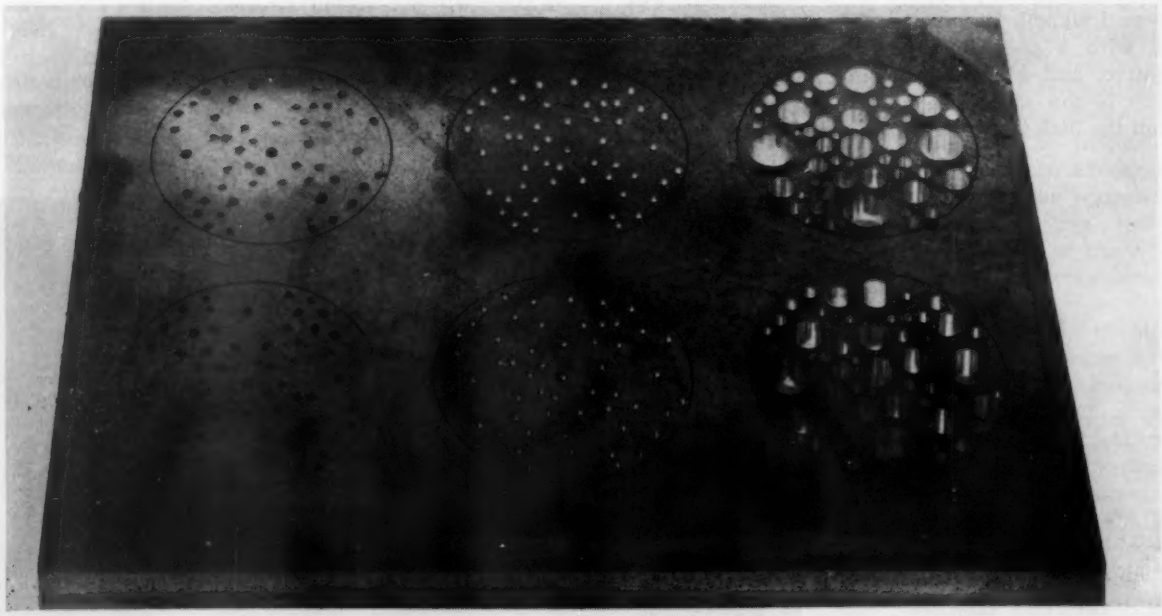


FIG. 3 .. Steps in machining polystyrene catacombs: left, holes centerpunched; center, holes center drilled; right, cavities completed. After completion, six blocks were cut apart and machined to size

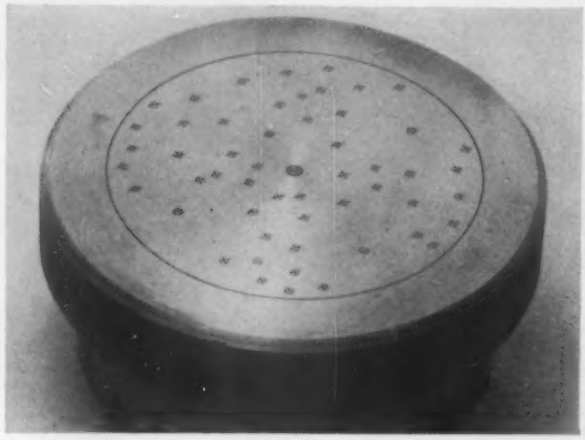


FIG. 4 . . Pattern printed on brass disk to be used in preparation of a templet

turned to the spinner, and a second coating of emulsion is applied and spun dry. The plate is then re-exposed so that a protective insoluble film is formed over the pattern. The piece may then be machined dry or wet without danger of marring the pattern during handling.

A typical layout is shown in Fig. 1. The polystyrene disk (left) shows only the drilling pattern while the other (right) shows the dimensions of the holes, the types of components to be inserted in the assembly, and lines to indicate crossover connections to be made at assembly. A pattern of this kind may be useful, not only for drilling but also for assembling the various components. These two pieces were turned to correct size before applying the patterns, and some difficulty was encountered in centering the pattern, as indicated by the slightly off-center position of the center holes in the disk, left.

To eliminate the problem, the holding fixture, Fig. 2, was designed. It consists of a negative-centering ring with a polymethyl methacrylate window, a negative, and a block-centering holder, the ID of which is the same size as the polyethylene disk. When the disk is inserted in the holder, the negative is centered with respect to it and is held flat and in close contact with the emulsion-coated surface of the disk. The device permits the use of commercially available polyethylene rod without machining.

The technique offers an excellent means of printing machining patterns on metal or plastic, provided only that the latter material will not be affected by the methyl alcohol in the developer. It insures uniformity from sample to sample because human errors, such as those resulting from incorrect dial settings on the index head or incorrect reading of the drawing, are eliminated.

LAYOUT TIME REDUCED

It is estimated that 4 hr are required to locate and center punch the 53 holes for each pattern, Fig. 1, when the positions are located by taking the dimensions from a drawing and adjusting the index head on a milling machine to locate each point. If the pattern has been placed on the material beforehand, however, about ½ hr is required.

The time required for the application of the pattern to the work is about 20 min, including application of the final protective coating. Thus the total time spent per unit is about 50 min, as opposed to the 4 hr required for conventional methods.

An additional step necessary with the photographic process is the preparation of the negative which requires about 1½ hr. However, because pattern dimensions must be determined and a guide drawing prepared for either process before any machining can be done, preparation of an accurate drawing for photographing does not add disproportionately to the time required.

Although chassis-blocks made thus far have all been circular in shape, the process could be applied to other shapes such as rectangular, square, and diamond. The holder for such configurations would be slightly more expensive.

Acknowledgment

The authors wish to thank Roy F High for assistance and suggestions in machining the patterned blocks.

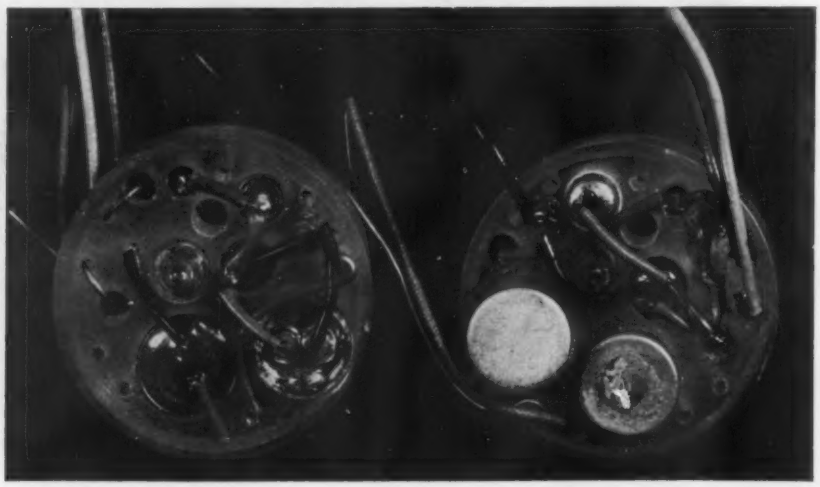


FIG. 5 . . Completed catacomb-type electronic subassembly, top and bottom views

How to achieve desired fits in parallel-key splines

Parallel-key splines, originally developed by the SAE, and retained in their current standards, are still widely used, although they are gradually being replaced by the involute spline (*AM*—July 4, '55, p112). As in the previous article, here are hard-to-find data on how to achieve the desired fit

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Parallel-key splines with 4, 6, 10 or 16 splines in accordance with the SAE standard are made in three kinds of fit and two classes of fit. The kinds of fit are: major diameter, minor diameter and side. Classes of fit are permanent and sliding. The sliding fit is further divided into sliding not under load and sliding under load, which differ in that the latter has a greater key depth.

For a permanent fit, either major diameter or minor diameter, clearance is recommended on the sides of the keys, unless violent torque reversals are expected. A permanent side fit normally requires clearance on the major and minor diameters. For sliding fits, clearance is necessary on the sides of the keys and the major and minor diameters. Usually a different hob is required for each kind and class of fit.

The hob teeth for all parallel-key spline hobs have curved sides to produce straight and parallel keys. The number of keys and the work diameter are limited to those for which hob was designed.

DIMENSIONING AND INSPECTION

For each number of keys, the key width is fixed and the key height varies according to the fit. The fitting of two parallel-key spline members is basically the same problem as the fitting of involute splines. To obtain the desired fit, consideration must be given to the *effective* size of each member. This requires the application of allowable errors and machining tolerances.

One problem involved in the hobbing of a parallel-key spline that is not encountered on an involute spline is the maintaining of the straight and parallel form to the required depth. In hobbing the involute spline, tooth thickness can be changed by varying the depth of cut while maintaining an involute tooth form. However, for the parallel-key spline, there is only one depth of cut that will produce the required straight and parallel key. As a result, it may be difficult to hold close tolerances on both the minor diameter and key width without changing the form.

The maximum amount of straight and parallel form produced by the hob depends upon the generating pitch diameter, the key width and the minor diameter of the spline. To avoid fillet interference with the internal member, the minor diameter of the external spline must be small enough to permit the hob to generate the required depth of straight and parallel form. Using the minimum generating pitch diameter, the diameter, *SPD*, to where the straight and parallel form is tangent to the minor diameter fillet may be found by:

$$PD = \sqrt{D_1^2 - 0.75(W')^2}$$

where $D_1 = D'$ or D_e depending upon whether the spline tooth is chamfered ·

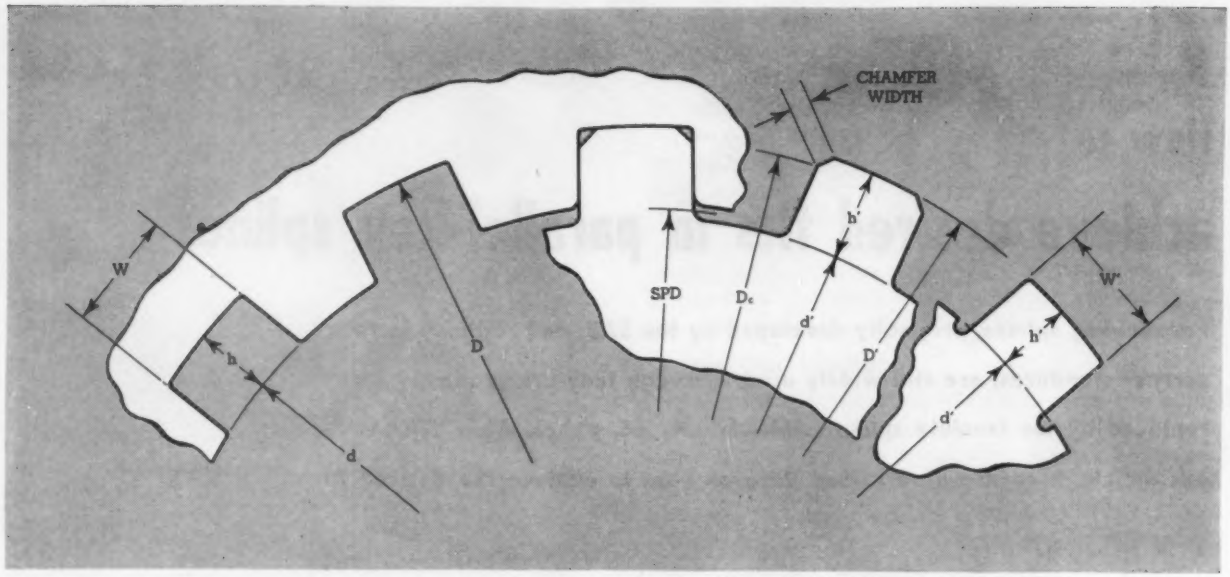
$$X = \frac{\sqrt{4PD(PD-d') + (W')^2} - W'}{2}$$

$$SPD = \sqrt{(PD)^2 + (W')^2 - (W'+X)^2}$$

As the expressions indicate, *SPD* may be reduced with a decrease in d'. Since the calculated *SPD* will increase with hob wear, it is advisable to design the internal spline to start contact slightly outside of this minimum straight and parallel diameter.

The application of allowable errors and machining tolerances to arrive at dimensional values has been discusssed in connection with involute splines. This same approach may be used for parallel key splines using the table of allowable errors (*AM*—July 4, '55 p 112) as a guide. Also, the table of dimensional and effective clearances in that article may be helpful. The relationship between effective size and dimensional size was also explained. Effective key size and effective clearance on the sides of the keys must be considered for all types of fits.

For each type of fit, the discussion that follows describes some of the important dimensions which should be considered when designing the spline members. It deviates from the SAE standard in that the suggested machining tolerances for the internal spline are similar to those for ASA standard involute splines. Also, the fitting allowances are based upon the involute spline standard. The sliding fits are discussed as a single class of fit, with



FORMULAS FOR STANDARD SAE PARALLEL-KEY SPLINES

No. Of Keys	W For All Fits	Class A, Permanent Fit		Class B, To Slide Not Under Load		Class C, To Slide Under Load		Nominal Major Diameter
		h	d	h	d	h	d	D
4	0.241D	0.075D	0.850D	0.125D	0.750D	——	——	To 3"
6	0.250D	0.050D	0.900D	0.075D	0.850D	0.100D	0.800D	To 3"
10	0.156D	0.045D	0.910D	0.070D	0.860D	0.095D	0.810D	To 6"
16	0.098D	0.045D	0.910D	0.070D	0.860D	0.095D	0.810D	To 6"

Extracted from SAE Handbook, 1953 edition

SYMBOLS

D	= major diameter, internal	PD	= minimum generating pitch diameter, external
D'	= major diameter, external	SPD	= straight and parallel diameter, external
D_e	= chamfer diameter, external	W	= chordal space width, internal
d	= minor diameter, internal	W'	= chordal key width, external
*d'	= minor diameter, external		
h	= whole depth, internal		
*h'	= whole depth, external		

* *When clearance grooves are required, d' and h' are respectively the diameter and depth to the land portion between the grooves.*

key depth, in accordance with the basic formulas, their only difference.

MAJOR DIAMETER FIT (applicable to all 4, 6, 10 and 16 key splines)

Permanent Fit

D — use basic with a suggested tolerance of + 0.0001 (7 + *D*), – 0.0000.

W — use basic which equals minimum effective; determine minimum dimensional and apply a tolerance of + (0.002 to 0.003), – 0.000.

d — use basic with a tolerance such as + 0.005, – 0.000.

D' — use (*D* + 0.0008 + 0.0001*D*) with a tolerance of + 0.0001 (9 + 2*D*), – 0.0000 to get interference fit with *D*. Include a chamfer on key at outside diameter.

W' — use (*W* – 0.0005) as maximum effective; determine maximum dimensional and apply a minus tolerance commensurate with application and method of manufacture. See hobbing tolerance table. For violent torque reversals, a closer key fit may be required.

d' — must be less than *d* to obtain clearance between minor diameters. It should be small enough so that the desired amount of straight and parallel key depth can be obtained.

Sliding Fit

D and *W* — same as for permanent fit.

d — use basic with a tolerance such as + 0.005, – 0.000.

D' — use (*D* – 0.0015) with a tolerance of + 0.0000, – 0.0001 (19 + 2*D*) to get a clearance fit with *D*. Include a chamfer on key at outside diameter.

W' — same as for permanent fit.

d' — less than *d* and small enough so that the desired amount of straight and parallel key depth can be obtained.

MINOR DIAMETER FIT (applicable to all 4 and 6 key splines, and 10A spline or 10 keys, Class A fit)

Permanent Fit

D — use basic with a tolerance such as + 0.005, – 0.000.

W — same as for permanent fit on major diameter.

d — use [d – 0.0001 (7 + 2d)] with a tolerance of + 0.0000, – 0.0001 (9 + d) to get an interference fit on d'. Chamfered teeth at minor diameter are recommended.

D' — must be less than D to obtain clearance between major diameters.

W' — same as for permanent fit on major diameter.

d' — use basic with a tolerance which will result in an interference fit with d. A suggested tolerance is + 0.0000, – 0.0002 (3 + d). Clearance grooves at the minor diameter are usually required.

Sliding Fit

D — same as for permanent fit.

W — same as for permanent fit on major diameter.

d — use (d + 0.0015) with a tolerance of + 0.0001 (19 + d), – 0.0000 to get a clearance fit on d'. Chamfered teeth at the minor diameter are recommended.

D' — same as for permanent fit.

W' — same as for permanent fit on major diameter.

d' — use basic with a tolerance of + 0.0000, – 0.0002 (3 + d). Clearance grooves at the minor diameter are usually required.

SIDE FIT (applicable to all 4, 6, 10 and 16 key splines)

Permanent Fit

D — same as for permanent fit on minor diameter.

W — use basic which equals minimum effective; determine minimum dimensional and apply a tolerance of + (0.0015 to 0.0030), – 0.0000.

d — use basic with a tolerance such as + 0.005, – 0.000.

D' — must be less than D to obtain clearance between major diameters.

W' — use (W + 0.003) to (W + 0.0045) as maximum effective, depending upon the amount of interference desired; determine maximum dimensional and apply a minus tolerance commensurate with application and method of manufacture. See hobbing tolerances table.

d' — must be less than d to obtain clearance between minor diameters. It should be small enough so that the desired amount of straight and parallel key depth can be obtained.

Sliding Fit

D and W — same as for permanent fit.

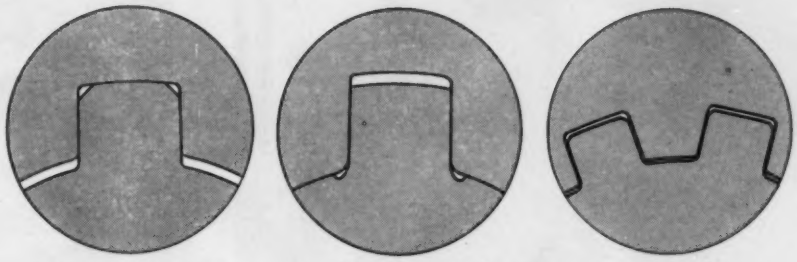
d — use basic with a tolerance such as + 0.005, – 0.000.

D' — same as for permanent fit.

d' — less than d and small enough so that the desired amount of straight and parallel key depth can be obtained.

W' — use (W – 0.0005) as maximum effective; determine maximum dimensional and apply a minus tolerance commensurate with application and method of manufacture. See hobbing tolerance table.

The dimensional inspection of key width and major or minor diameter is most commonly accomplished with micrometers or gages. To check the effective size of a spline member, a composite-type gage is required. The problems involved in gaging a parallel-key spline are comparable to those for the involute spline, as discussed in the previous article.

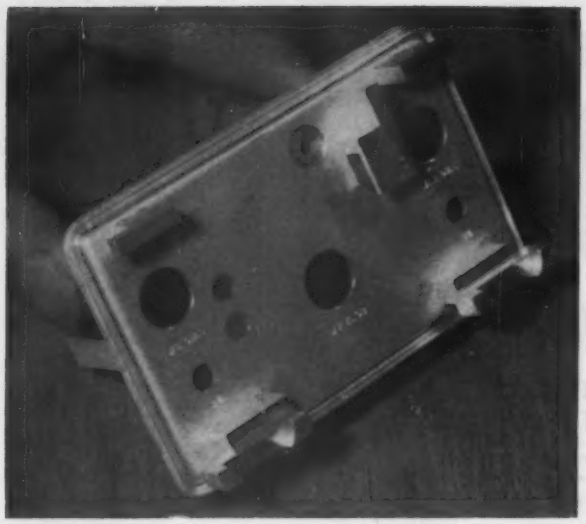


MAJOR DIAMETER FIT | MINOR DIAMETER FIT | SIDE FIT

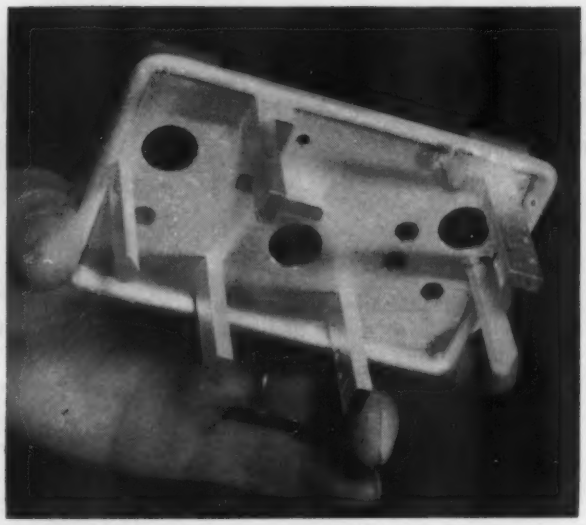
HOBBING TOLERANCES FOR PARALLEL-KEY SPLINES (SINGLE-THREAD HOBS)

Hob Class	Spline Elements	Outside Diameter of Spline Shaft, In. 0-1.499	1.50-2.499	2.50-3.499	3.50-4.99	4.50-5.499	5.50 & over
3 AND 4 KEYS		(in ten-thousandths of an inch)					
Ground	Key Width	10	20	20	25	30	35
	Minor Diameter	20	20	30	35	40	45
Accurate	Key Width	15	25	25	30	35	40
Unground	Minor Daimeter	25	25	35	40	45	50
Commercial	Key Width	20	30	30	35	40	45
Unground	Minor Diameter	35	35	45	50	55	60
6 TO 10 KEYS							
Ground	Key Width	10	10	20	20	25	30
	Minor Diameter*	10	10	20	20	25	30
Accurate	Key Width	15	15	25	25	30	35
Unground	Minor Diameter*	15	15	25	25	30	35
Commercial	Key Width	20	20	30	30	35	40
Unground	Minor Diameter*	25	25	35	35	40	45
10 KEYS AND OVER							
Ground	Key Width	10	10	10	20	20	25
	Minor Diameter*	10	10	20	20	30	40
Accurate	Key Width	15	15	15	25	25	30
Unground	Minor Diameter*	15	15	25	25	35	45
Commercial	Key Width	20	20	20	30	30	35
Unground	Minor Diameter*	25	25	35	35	45	55

**For full-fillet splines, the minor diameter tolerance should be 1.5 times that shown in the table. Hobs for closer key tolerances are available.*
The minor diameter tolerance shown is based upon holding the corresponding tolerance on the key width.



a) weldment top



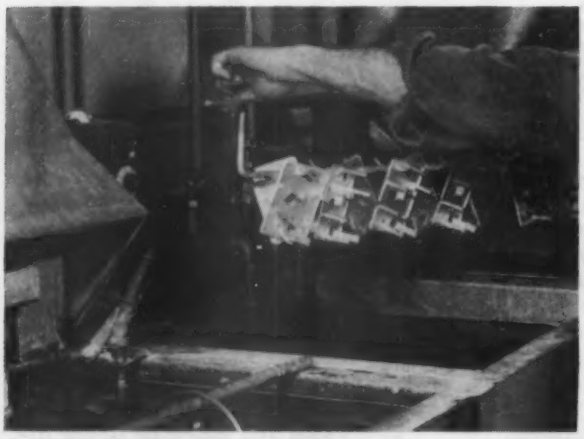
b) weldment bottom

WELDMENT consists of one 52S aluminum-alloy plate (0.062-in. thick) and 13 24S-T6 al-alloy posts, with five posts on one side of the plate and eight posts on the opposite side. Plate is the cover-

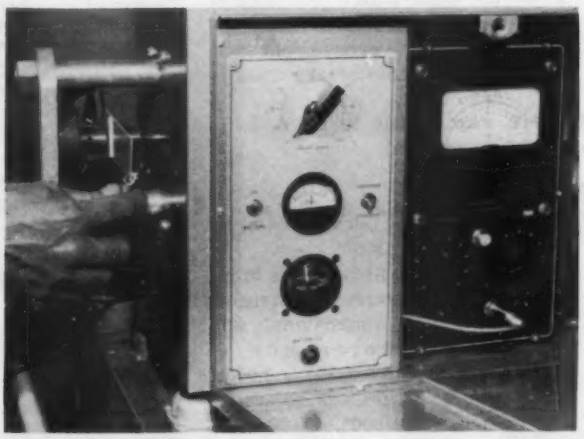
PROJECTION WELDING ALUMINUM: How to assemble for lower weight,

Ford Instrument Co, a division of the newly formed Sperry Rand Corp, is the only firm in the East—perhaps in the nation—to resistance-projection-weld aluminum alloys on a production basis. With techniques worked out to solve a serious problem, the company now considers the task routine. Design and manufacturing are worthwhile additions to your "know-how collection"

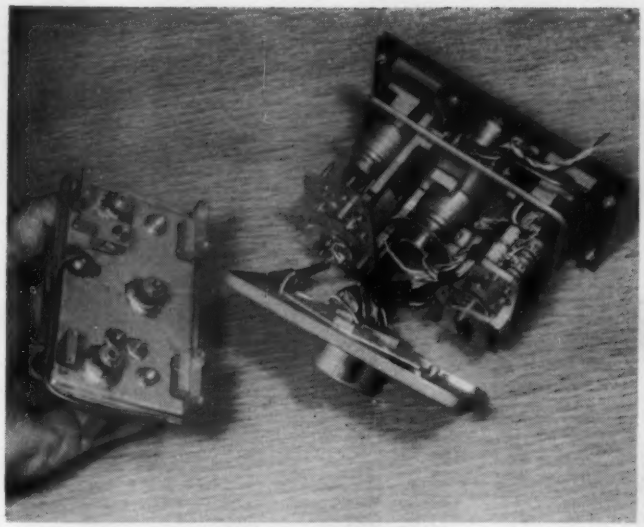
WM M STOCKER, JR, associate editor



CLEANING CYCLE is first step in process and extremely important. Parts are hung on a rack and given 7 to 8 min. in Clepo 86P, a non-etch alkaline cleaner mixed in a ratio of 8 oz to 1 gal. of water. Solution is at 180F. Then parts are rinsed in water at 180F for 1 to 2 min. Following this, pieces are given an additional rinse in water at room temperature. Next they are placed in Clepo 180 deoxidizer solution, at 85 F, for 8 to 10 min. and, finally, they are given another water rinse at room temperature and are air dried. This cycle must be repeated if parts are not welded within a 12-hr period after cleaning or if resistance is high because of contamination

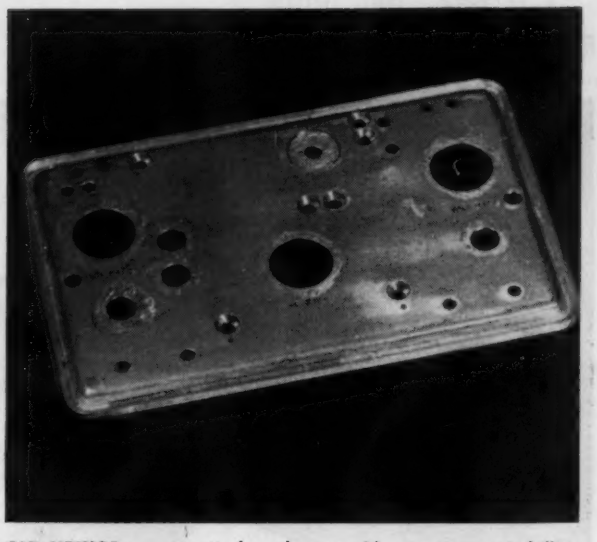


RESISTANCE, hence cleanliness, is checked on a Weltronic micro-ohm and Millivac millivoltmeter combination tester for sample pieces from every batch of parts. To assure uniformity of cleaning, there can be no more than 10 micro-ohms resistance between any two pieces. This test is very important because everything else depends upon it. Only fixed values can be set in the welder, which must be reset every day to compensate for changes in resistance from humidity, etc. A good operator can tell from the sputter if the weld zone is dirty



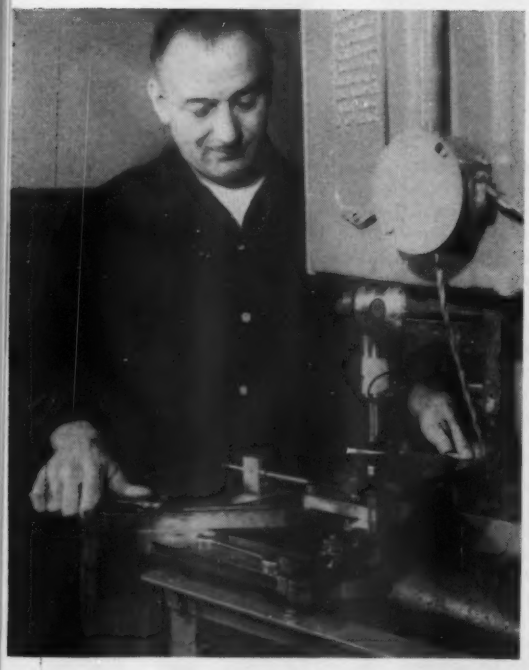
c) complete preset assembly

assembly base and actually comprises the entire mount for the preset control box used with Ford Instrument's aircraft Ground Position Indicator. All of the precision gearing and electrical assemblies are mounted on these posts



OLD METHOD was to attach each post with screws; meant drilling 26 additional holes in each plate, having a number of people assemble posts to plates and solder seal each screw for hermetic joints. Holes weakened the plate and screws increased the weight; also there was a danger of loosening and sealing was a headache. All of these problems are avoided by using a weldment

higher strength, better performance



a) Setting up master plate

SETUP FOR WELDING must be sufficiently accurate to hold all posts within a tolerance of ± 0.002 in. of each other in position and straightness. An excess of 0.020 in. is left on the length of each post to permit a fly-cutting cleanup operation after the weldment is complete. Pyramid projections, instead of round, are milled on each post. This shape provides more surface and better contact; is easier to produce. During welding, the post is supported by the lower electrode.

b) Aligning electrodes projection on post

Because each of the 13 posts is different, each requires a set of specially shaped electrodes, and each post has a special Micarta positioning jig. Each post is set up individually, and batches of 50 assemblies are processed per setup. Preparation consists of lining up a master plate and master post in a positioning jig, then dressing electrodes for perfect match. With lower electrode fixed, upper electrode is brought down through master plate to match lower one.

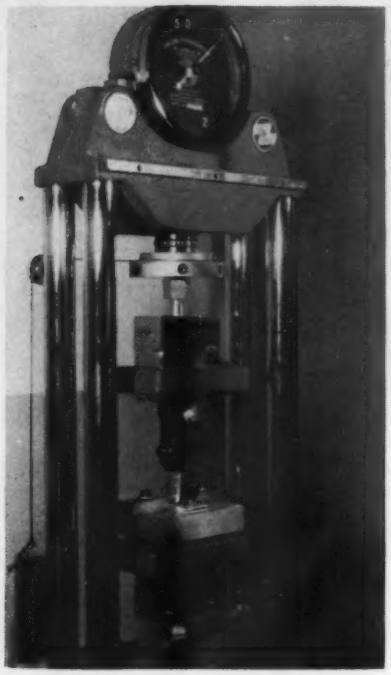
Faces are dressed using a mill-smooth file with a swiveling or lapping motion. Then file marks are smoothed with fine emery paper wrapped around a *flat* aluminum block. Match must be perfect as overpenetration of one projection will cause burning. If upper electrode is not straight and square, impression on opposite side of plate will be unsightly. A good setup leaves no mark or scar.

c) Final dressing of electrodes with emery cloth

After dressing electrodes, adjustments are set into the welder. Tentative settings are established, by trial and error, for each of the 13 pieces. These factors include squeeze-time cycles, hold-time cycles, selector (single or dual), forge delay, weld-time cycles, post-heat switch, post-heat time cycles, post-heat level, weld-heat levels, transformer taps, initial pressure, and final pressure (in pounds).

Machine is Taylor-Winfield 100-kva press welder equipped with anti-friction welding head utilizing preload roller bearings and a rolling-diaphragm air lock for maximum welding accuracy PLEASE TURN PAGE

1) Checking pressure vs current



2) Tensile test

FIG A

FIG B

TEST PIECES are prepared and tensile tested initially and every hour during the welding operation—to achieve uniform readings for a representative number of pieces. Strength of 450 to 500 lb is satisfactory; is equal to the strength of two screws. Most welds withstand 750 lb or more. This is based on a double ⅛-in.-dia nugget. Only one post uses a single nugget. Periodically, samples of welded sections are sent to Quality Control for macroscopic analysis, and sometimes, X-ray. Then representative pieces are plotted on an oscillograph paper-tape recorder, which shows the relationship of pressure to current, and the tentative welder settings are corrected to the improved figures.

Of the two X-ray photos shown, Fig A is unsatisfactory because the nugget area of the weld is unequal. Either pressure or current is at fault, though unequal surface resistance will also create this condition. Slight crack in left nugget might be eliminated by post heat (heating after weld to minimize strain). Slower cooling will eliminate crystalization. Plate is 0.062 in. thick. Weld penetration is 30%, using a pyramid-shaped projection. Fig B is good; shows uniformity of penetration, equal nugget size and shape, very little flaring at base of post.

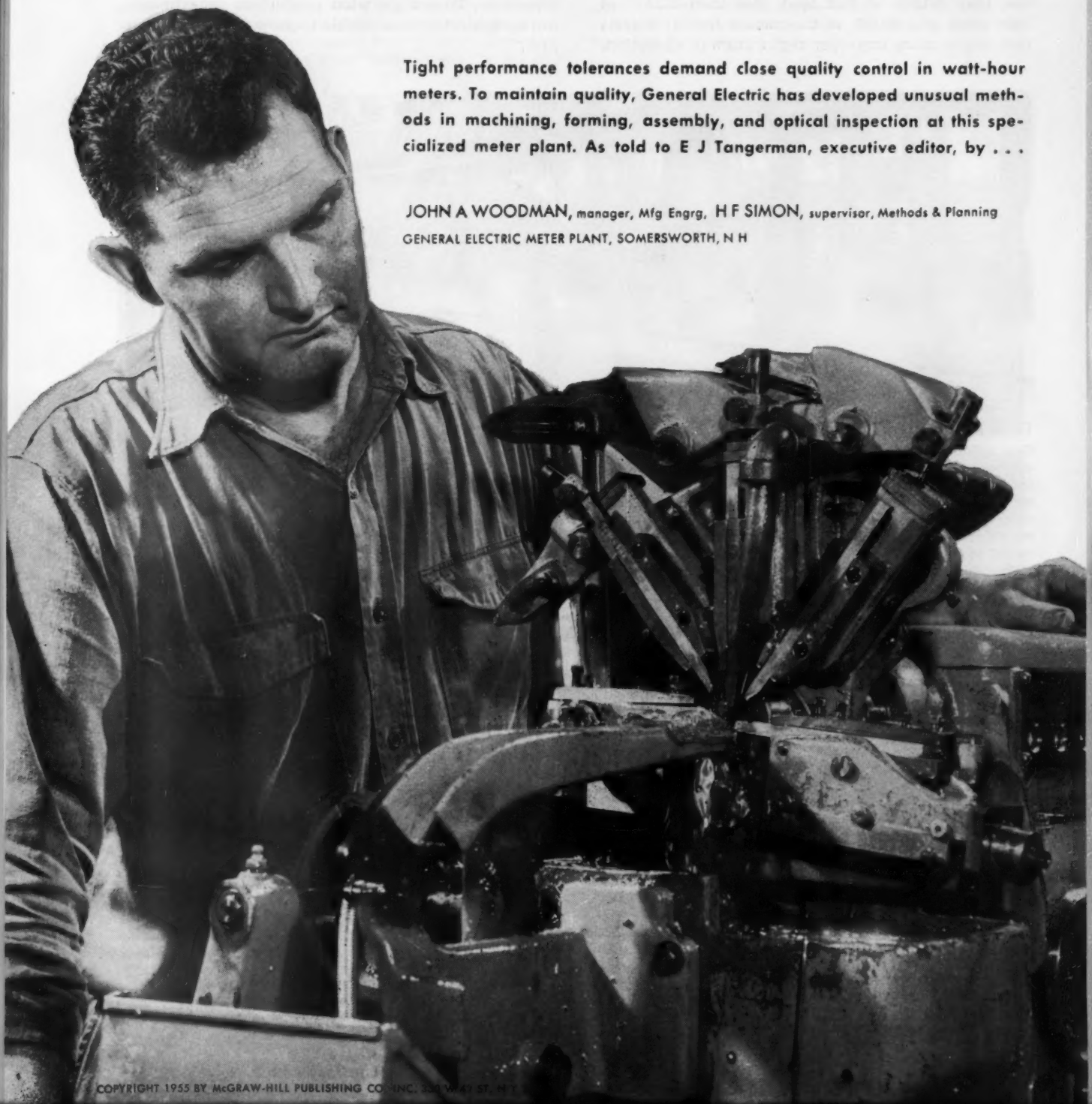
Production welding is the final step. The entire preparation and setup for a batch of 50 pc takes 3 hr. Run time on the welder is an additional 2.5 hr, for an average total of 6.6 min per complete weldment. Remember that each post, because it requires individual setup, is run through as a batch, hence this time covers handling 13 batches or 650 pieces for 50 assemblies. Total time for welding complete weldment, in lots of 50, is 1.43 hr.

American Machinist SPECIAL REPORT NUMBER 398

Tooling and training tell the tale when quality control is the watchword

Tight performance tolerances demand close quality control in watt-hour meters. To maintain quality, General Electric has developed unusual methods in machining, forming, assembly, and optical inspection at this specialized meter plant. As told to E J Tangerman, executive editor, by . . .

JOHN A WOODMAN, manager, Mfg Engrg, H F SIMON, supervisor, Methods & Planning
GENERAL ELECTRIC METER PLANT, SOMERSWORTH, N H



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Statistical quality control checks precision production

To evaluate tooling and training at Somersworth, it is advisable first to understand the objective. The principal product is the I-55 watt-hour meter, sold in quantity to public utilities with a certification of performance within 0.1% of the reference kwhr, and standard deviation of accuracy distribution of less than 0.15% at full load, less than 0.20% at light load, and 99.9% of the meters free of defects that might cause improper registration or operation.

To hold to such a performance guarantee, certified inspectors make final checks against points on a tally sheet and a certified roving inspector initiates immediate corrective action, in the responsible department, for items appearing frequently on the tallies. This procedure minimizes final-inspection rejections. To explain what production departments are up against, it is advisable to show final inspection first.

TESTS ARE AUTOMATIC . . .

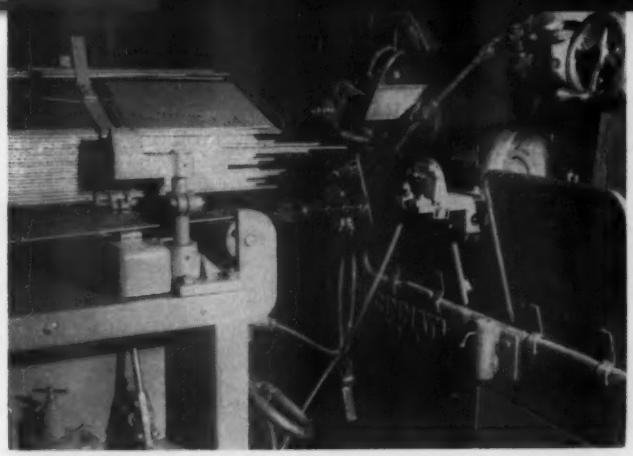
Final calibration follows all adjustments. Stations in this bank are automatic photoelectric test mechanisms which calibrate the meter for full load, light load, and lag against standards. All tests are automatic, so one operator handles eight stations. She clamps a meter by air in the station and a pushbutton starts the test by energizing a magnetic coil. This sets the rotary stepping switch to its first position, zeroes the "standards", and supplies power to the meter. Light impulses, caused by light shining on a photoelectric tube through anti-creep holes in the meter disk, actuate the rotary stepping switch to continue the test. Readings for the three different checks (the relationship of disk revolutions on the meter under test to those of the standard) are projected from a film off each standard to an appropriate frosted-glass screen at top. This indicates to the operator how to adjust for calibration. If a station panel fails, it is pulled out bodily and replaced with a spare. Then the station is checked against the master and recalibrated or repaired

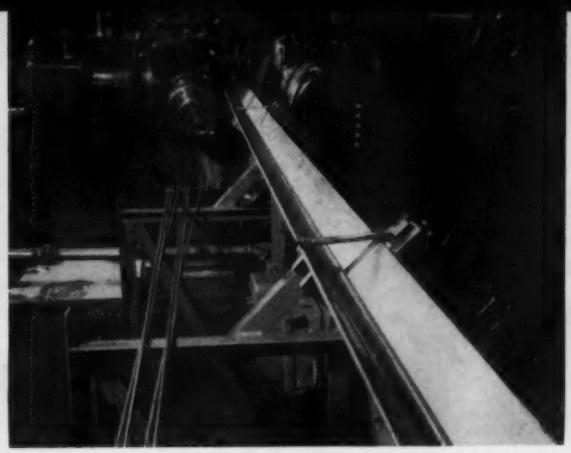
GOLD SEAL CERTIFICATION . . .

After final calibration, meters come to these certified inspectors. Each has his own identifying stamp for the gold seal applied as evidence of test, so is particularly careful. Any imperfection, even suspected, throws the meter off the line for detailed examination

MASTER TEST PANEL . . .

This master panel monitors quality on the individual calibrating panels, and is also used for testing random samples taken from the line. One half of one percent of all meters built are completely torn down for detailed checking

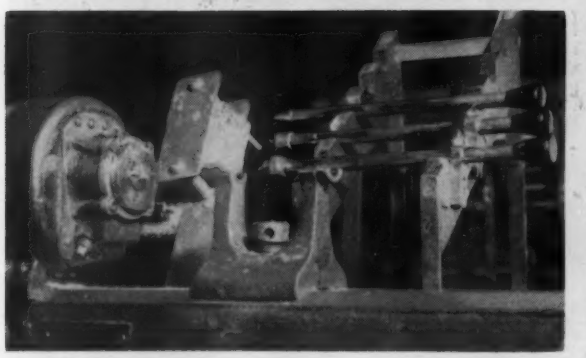




ROD HANDLERS FOR CENTERLESS . . .

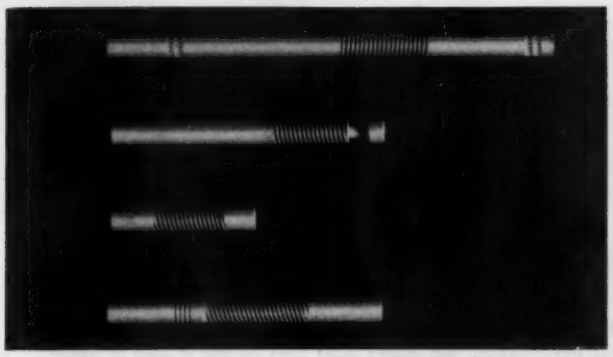
Aluminum bar, ⅛ to ⅜ in. in dia and up to 12 ft long, must be ground to size for the automatics. This is done in a Cincinnati centerless grinder fed by a Lipe-Rollway bar feeder (left) of the type used for screw machines. Bar emerging from the grinder enters an angle-iron trough held on two hinged brackets (right). The end of the bar trips a precision miniature switch, operating a timer which opens valves of air cylinders on the brackets, tilting the angle iron to drop the bar gently onto a stacker. This prevents scoring and bending of the fragile and precise bars

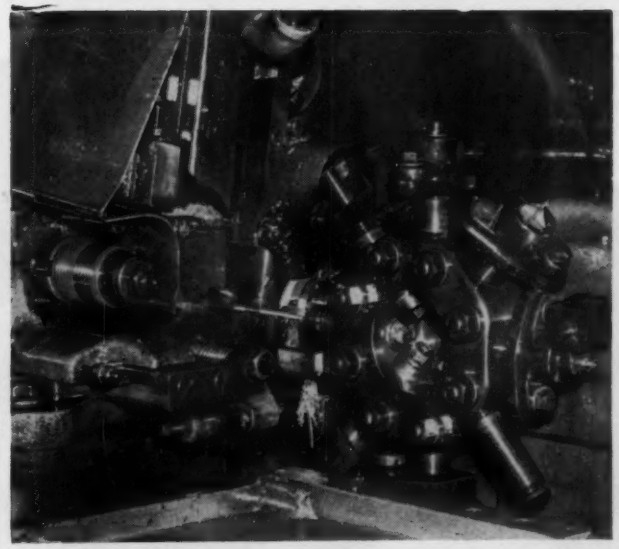
Now to outstanding tooling



12,000-RPM LATHE . . .

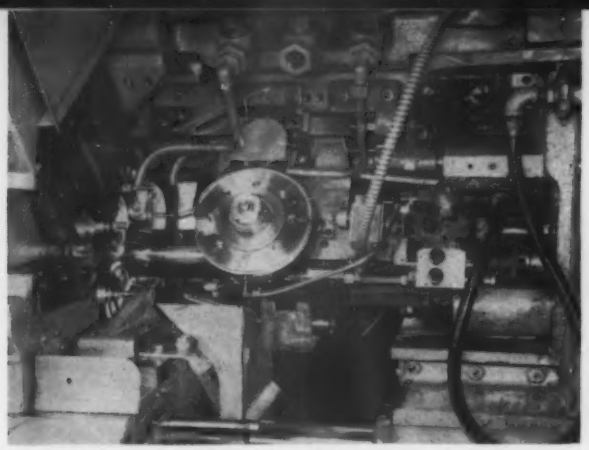
Small parts are produced on speed lathes which operate at 12,000 rpm. These are set up so a single control pedal operates a solenoid brake and opens the collet to save time. A special adjustment on the chuck makes it possible to attain centering within required tolerances; it shifts the collet sleeve as required to take out any eccentricity

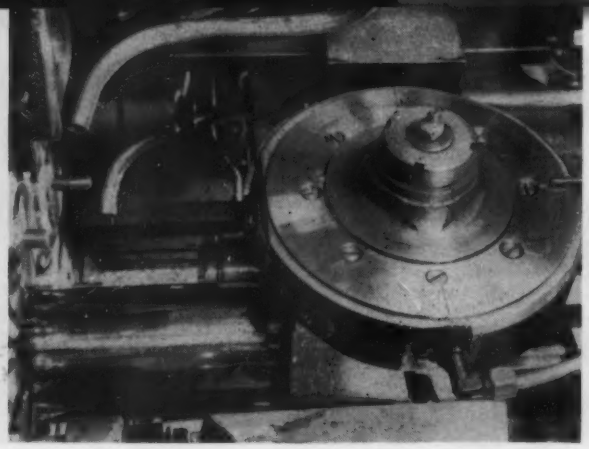




SINGLE-POINT THREADING . . .

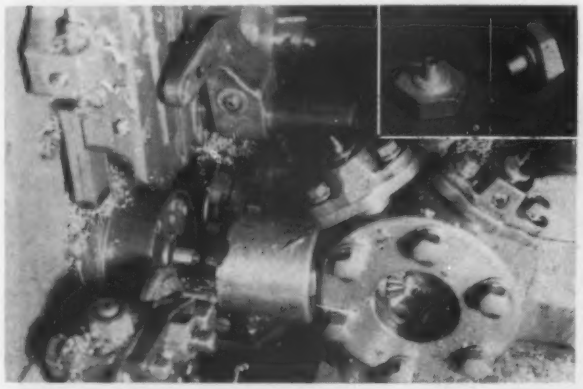
Shafts for meters are of ⅛-in.-dia aluminum rod. They must be threaded for 1, 2, 3 or 4-start worms that go 1/32 in. deep, leaving a root diameter of only 0.062. A die would tear the threads, and cutting a thread of high pitch to depth in one pass would result in bending, particularly on multi-start threads, and would not give required finish. To avoid this, all worms are cut with single-point tools in multiple passes on B & S #0 screw machines with thread-chasing attachments. All but the 4-start thread (closeup) take a total of about 30 passes. A triple worm is put on in about 18 sec by this method





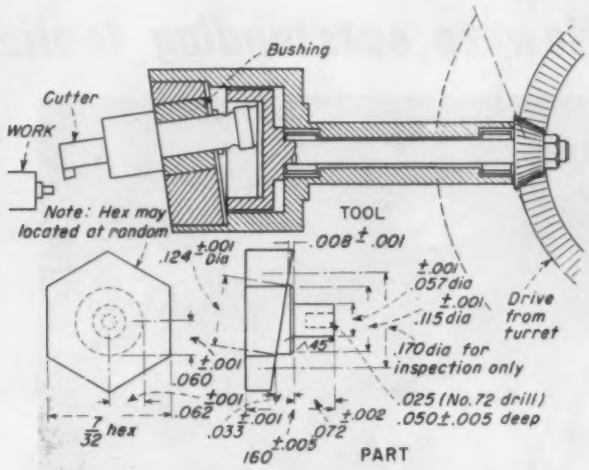
SCREW-MACHINE SLOTTING . . .

To put a screwdriver slot in the ends of small screws, a feed drum has been attached to the frame of the New-Britain Gridley Model 60 on which they are made. The drum picks up the threaded screw and indexes clockwise ⅛ turn per cycle. At the second index, the screw is exposed to a slotting saw mounted on the carriage. Forward stroke of the carriage pushes the saw down along a wedge-shaped cam and slots the screw. The drum replaces a transfer arm which would not work as effectively in this instance—cycle time is 2 sec, of which 1.18 sec is index, leaving too little time for slotting in the conventional way. A cover over the drum holds the slotted screw in until the sixth index, when an air blast ejects it into a hopper. Screw shown actual size at left



HEAD TAPERED ON SCREW MACHINE . . .

This tiny (7/32-in. hex) plated brass rivet (photo) is used to adjust end shake in a bearing assembly by rotating the head and thus changing the clearance between its tapered lower surface and the end of a pivot. So small a part would be difficult to pick up and slot for screwdriver adjustment in assembly, so it is made from hex stock and adjusted by wrench. It is turned complete on a #00G B & S automatic screw machine in a 7-sec cycle. The spindle is stopped,



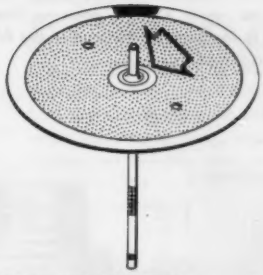
then the angular surface is milled by a turret-driven rotating hollow-mill attachment (sketch) built special with a spindle cocked at 8°. The required surface could be generated with a hollow mill, but because of size and sharpening problems with so small a cutter, a simple flycutter is used

DRILLING WITHOUT BREAKOUT . . .

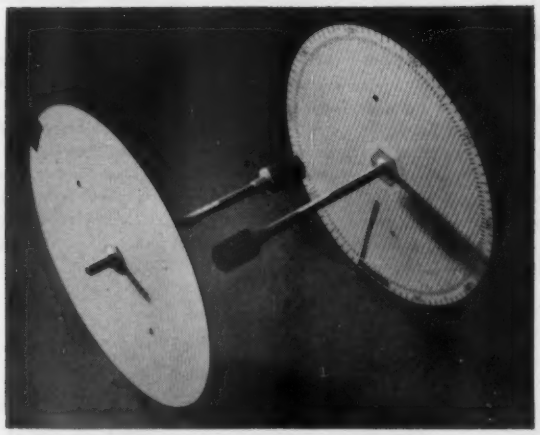
Aluminum worm shafts have graphite washers in their ends to act as guides. Washers were drilled and reamed to 0.020-in. dia plus or minus 0.0005 in. Difficulties were experienced in machining these holes, ie: maintaining surface finish, holding size, and breakout at the inner end of the washer. Investigation showed the cause to be insufficient surface speed of the drill in relation to rate of feed. The

remedy was this setup—a motor belted to a drilling spindle to develop 36,000 rpm. No matter how fast the feed now, the drill cuts instead of chipping, and the higher speed gives a finish so high that reaming is unnecessary. Shafts are fed from a "matchbox" delivery unit, and the drill is fully enclosed, work being fed in through a bushing that locates it

Die Casting Is Versatile



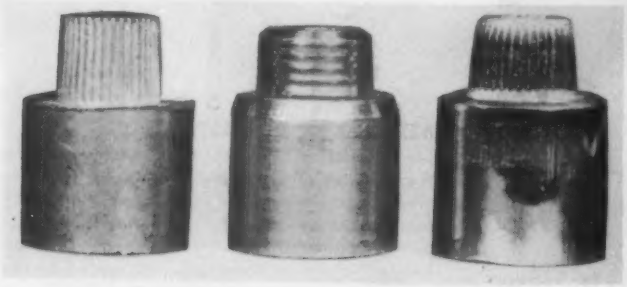
ASSEMBLY BY DIE CASTING . . .
Several complex assemblies are made by die casting the parts together in a low-cost, flexible ⇵10 Fisher die-casting machine made in Peterborough, Ont. The assembly must be completely flash-free so no minute particles of metal can fall into the meter and cause failure. No second operations are needed because molds are so accurately made that flash is not formed. Here the operator has completed the assembly shown in the sketch. He places a disk from the stack at his right in the fixture, a shaft from the dispenser at left in the hollow mandrel, and brings the two together, then tilts the fixture over the pot and makes the shot. Assemblies hereafter are in a special wooden carrier to prevent bending or other damage

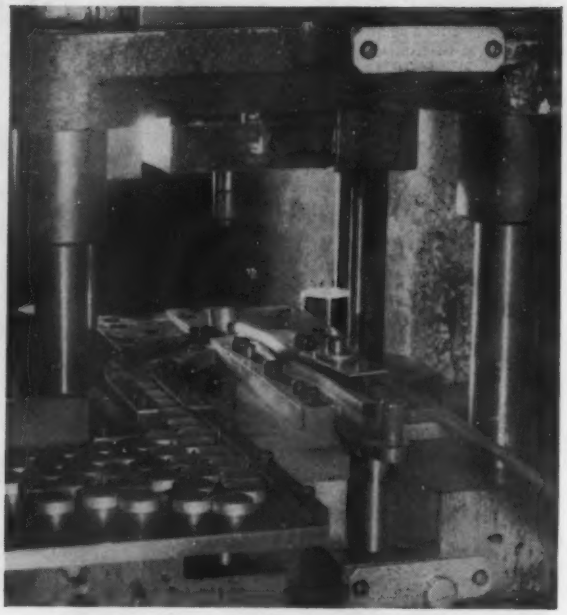


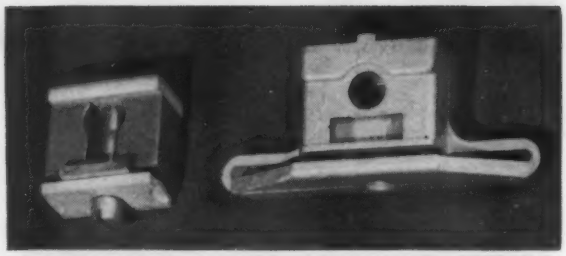
SUSPENSION MAGNET CAST IN PLACE . . .
The assembled disk and shaft are placed in another fixture on a Fisher ⇵10, with a graphite-cored suspension magnet from the tray at left placed in the head. The lower lever is advanced to put them together, the upper lever swung over and locked to close the mold, and the fixture tilted over the pot for the shot. Here the operator removes the assembly, which has die-cast teeth on its circumference. The aluminum-base die-cast metal creates a firm bond and gives excellent alignment of elements

EXTRUDED BEARING SHELL . . .

Top bearing shells were originally aluminum die castings (left in closeup). These were changed to screw-machine parts (center) to save almost $8000 per year. Now the parts are made by impact extrusion (right) at a further saving of over $9000. Blanked slugs with 100% shear on the sides are tumbled, degreased and lubricated (2½ parts 72° naphtha, 1 part solvent dispersion wax) under close control, then impact-extruded in a V & O press under 45 tons pressure. They are hand fed, but air ejected. Slugs are ⅜ in. thick by ⅜ in. dia; the finished shell is hollow (see sketch at lower right of this page)





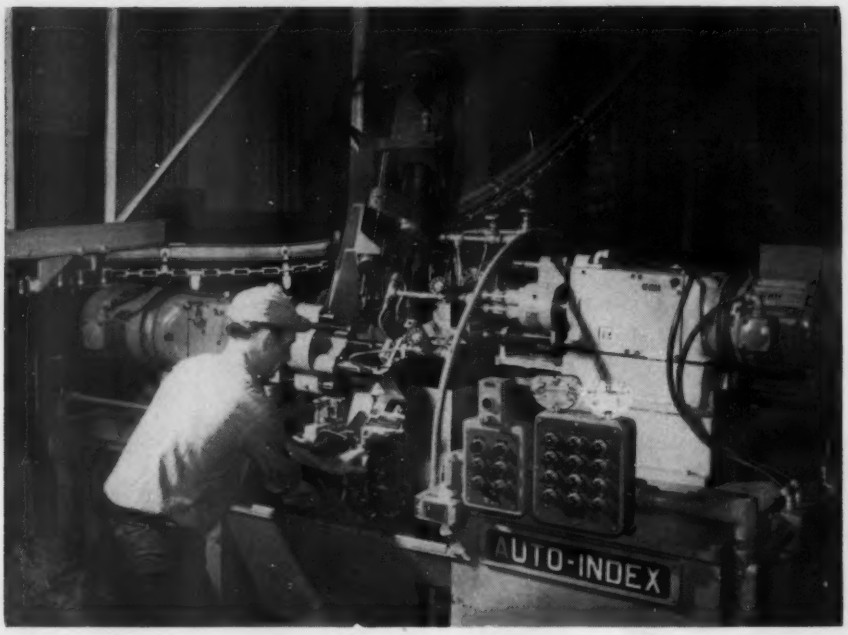


ALNICO INSERT . . .

Both the meter frame (next page) and the damping-magnet unit are aluminum-base die castings made in a 400A HPM die caster. For the damping-magnet unit, two alnico straight magnets are mounted between a steel base and a takeout block, a steel keeper is added, and the assembly held together by a screw. This is set in the die caster and the shot covers all but the keeper face and the magnet poles. Then the takeout block and screw are removed to make the assembly at right. Very accurate location is essential. Because of the abrasive character of alnico, mold locating points are of Carboloy

GUIDE PIN CAST IN . . .

Top bearing shells formerly contained a single cunico ring magnet; they now have two-cold-sintered alnico magnets for the top bearing at a saving of $148,000 a year. Magnets are made in a Stokes press. An 0.019-in.-dia steel guide pin is cast in the center of the shell in a Fisher #12 die caster as shown. The assembly is placed in a housing, the pin in a holder, the two brought together as the mold is closed, and the fixture tilted over the pot for the shot. As in other die-cast assemblies, no flash is permitted, and runout tolerance must be under 0.005 in. tir. Production is over 600 units per hour



MULTI-OPERATION . . .

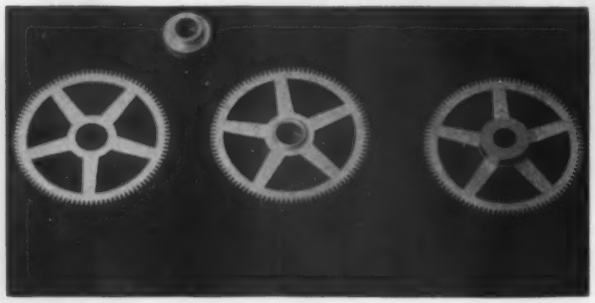
Aluminum meter frame has circular alnico magnet inserts (side circular projections) for drag on the disk. After die casting, it must be machined. This 11-head Kingsbury auto-indexing machine does 28 drilling, counterboring, boring and tapping operations in two directions. The operator merely loads parts in the fixtures

WALNUT-SHELL BLAST . . .

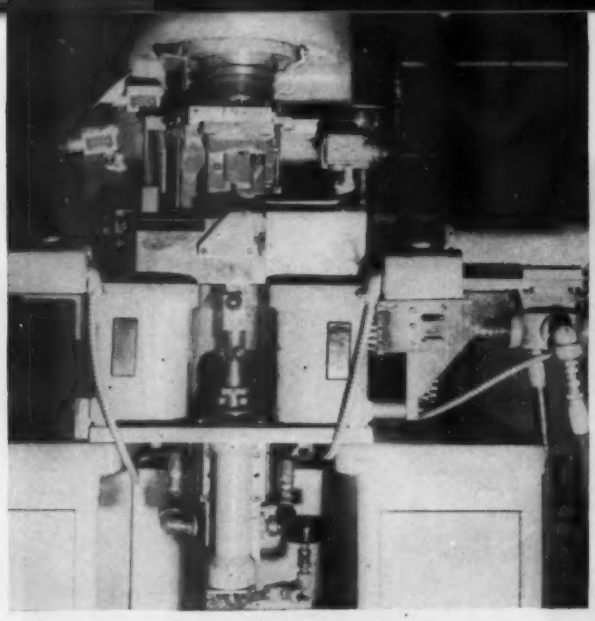
To obtain a desirable luster on frame surfaces, a twin-table Pangborn Rotoblast buffs them. To obtain this finish, many abrasives were tried. Steel shot or grit creates a matte surface which shows fingerprints. After extensive tests, it was found that crushed walnut shells produce the desired buffed finish and yet remove burrs. The latter were formerly handfiled off, but this frequently results in slivers of metal that could cause operating trouble, and was of course far more costly

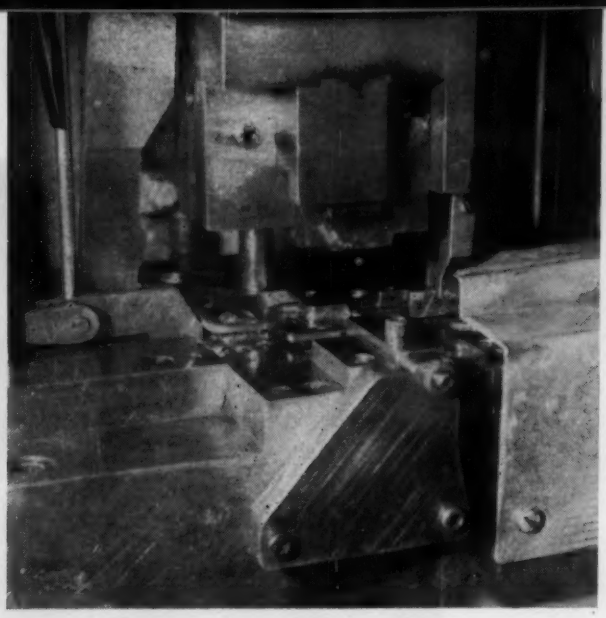
Some press jobs are unusual

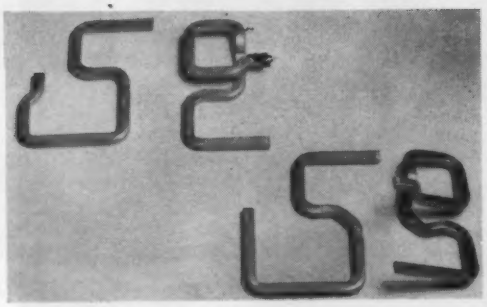
STAKED ASSEMBLY . . .
Register gear (1 3/16 in. dia x 1/32 in. thick) and hub are assembled on a Denison Multipress with 6-station rotary table indexing automatically. A rotary hopper and feeding mechanism positions the hub in the fixture. The operator takes gears from the tray and places each over a hub. The assembly is indexed under the punch for staking, then is mechanically ejected and swept off the table into a container. Cycle is 1500 assemblies per hour



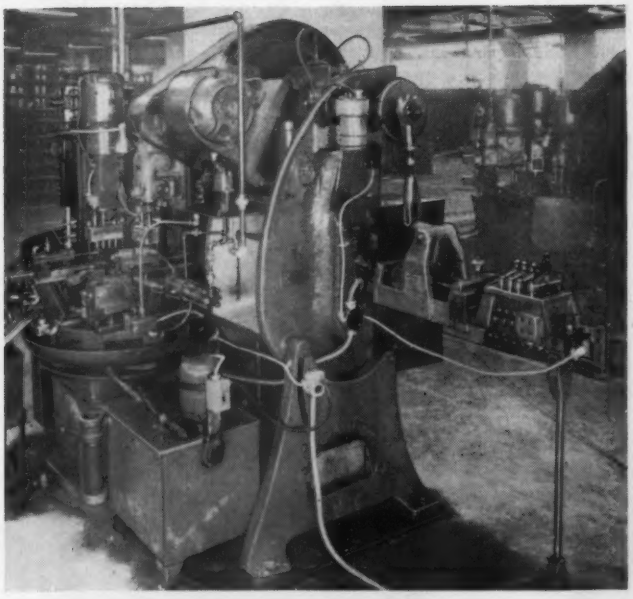
REGISTER STAKED . . .
Assembly of registers is done by staking in Denison presses along a conveyor belt. Here the solenoids for pushbutton control can be seen at press tops. Closeup shows the pushbutton itself (guards removed for photo) — a GE replacement for usual lever controls. Note that one production line handles normal production, the other specials or a short-run product. The same operators operate either line, can be shifted quickly in case of production tie-up on the main line or for a special run; there are no holdups for repairs or tool changes. The same setup is used on meter assembly itself

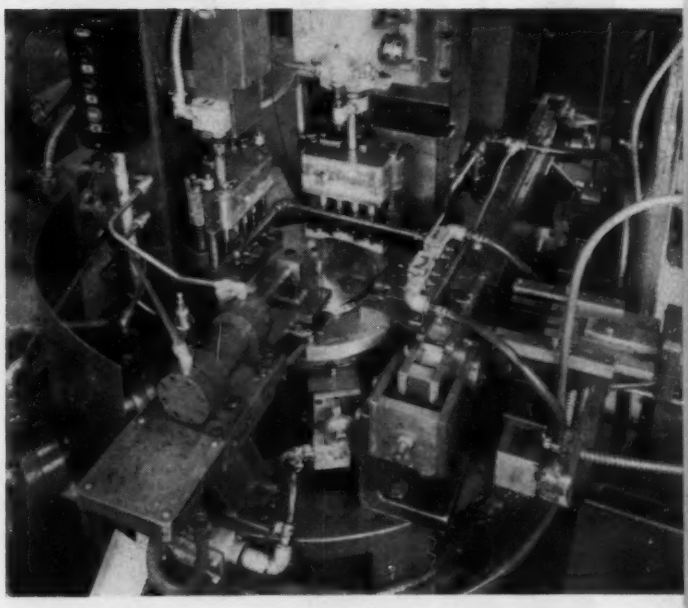


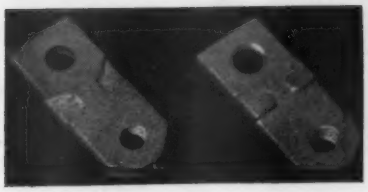




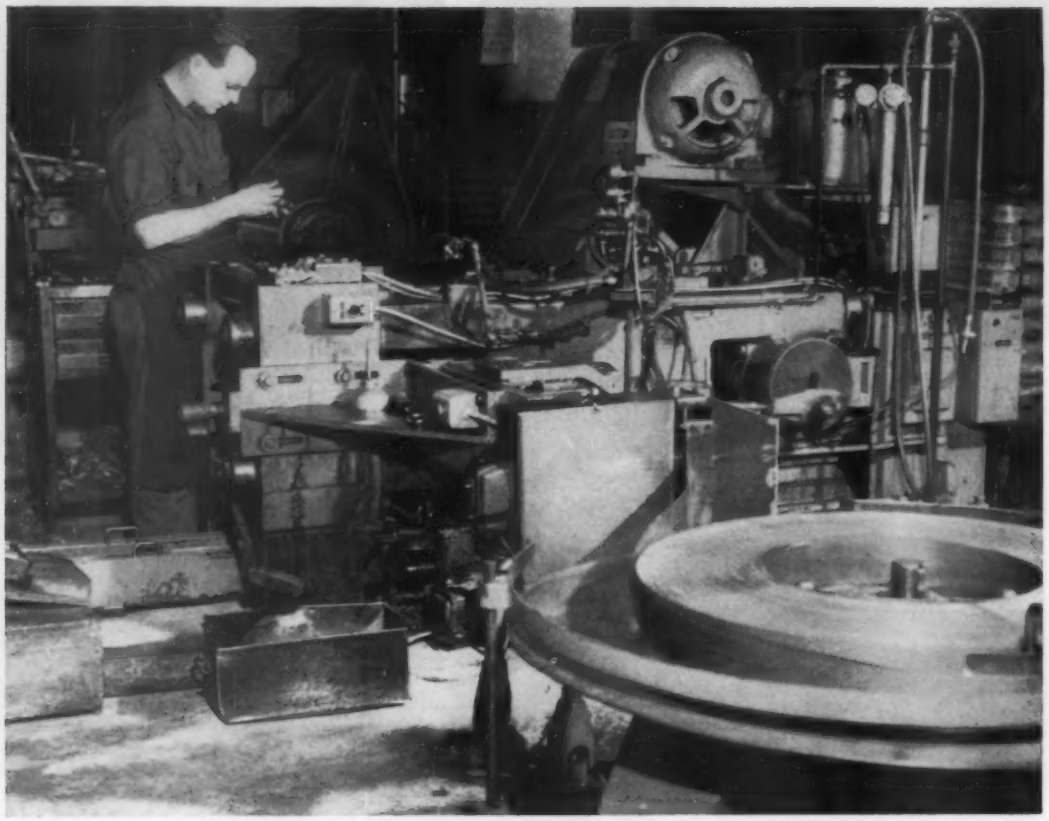
3-RAM PRESSES . . .
These two complicated copper current coils were formerly made on multi-slide machines; now are produced in two operations each on Denison Multi-presses. The second-operation machine is equipped with auxiliary slides in each case. The first operation "winds up" the length of 0.134-in.-dia wire, the second creates the 3-dimensional shape to exact tolerances. Bends in one direction are made by the upper ram, counter bends by the lower ram, then the side ram moves in to complete the piece

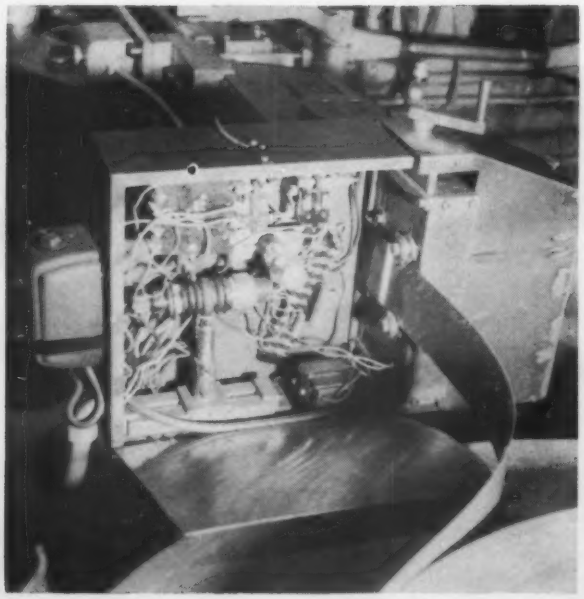






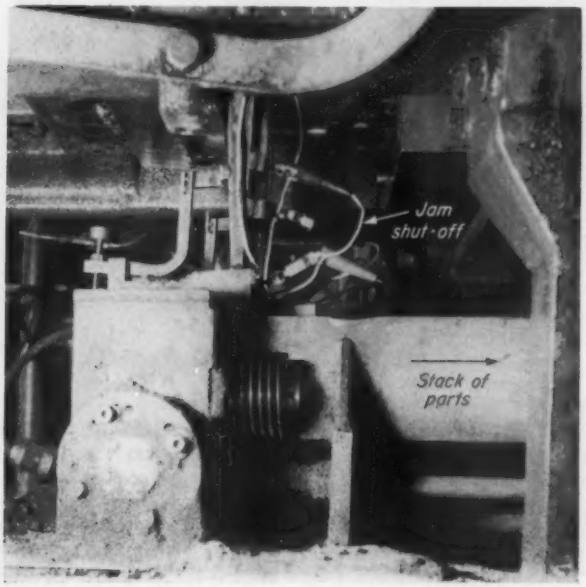
PRESS AUTOMATION . . .
A 25S V & O press has been tied in with a Hole Engrg countersinking and tapping machine to produce a terminal clip strap from coil stock. Coil stock enters the press from a reel, is blanked, then fed through a transfer to a conveyor which transports parts in front of an injection slide. This slide pushes parts, four at a time, into fixtures on the rotary indexing table of the Hole Engrg machine. After countersinking and tapping, the parts are ejected through a slide. Gross production is 3600 per hr



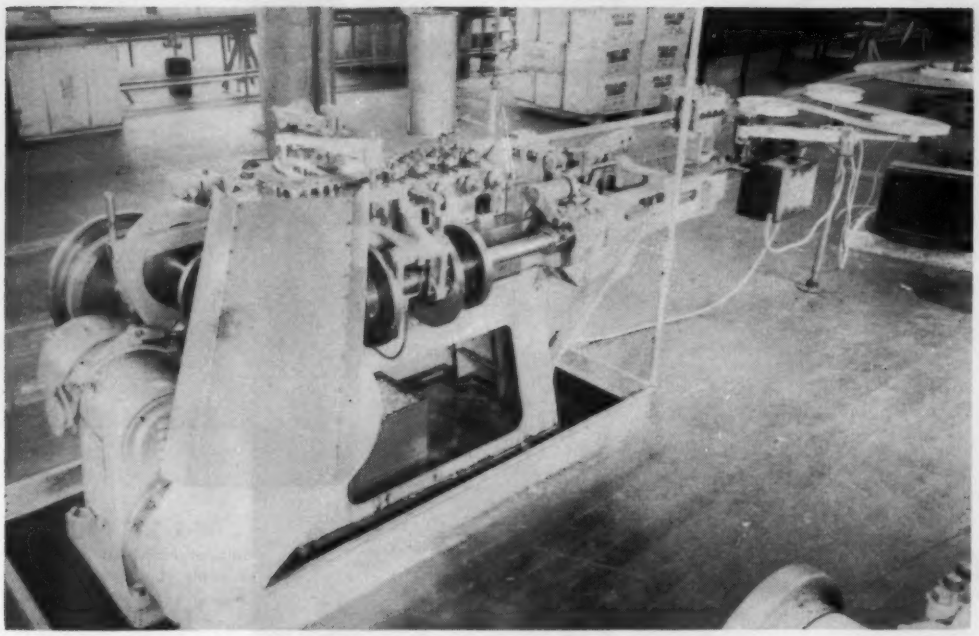


COORDINATED SETUP . . .

Another V & O setup, worked out by GE methods and tool engineers, produces laminations. Coil stock is flattened and fed automatically into a compound die. Blanks drop into a stacker below, while scrap passes through, is cut, and lifted into a tote box. The stacker has two counter-rotating helical finned shafts which trap laminations, hold them vertically, and feed them against the stack in a trough. To protect the carbide dies, a photocell (closeup) scans incoming stock for holes and voids. The press is a 4¼ V & O. Safety and speed were the objectives, so successful that two men handle three setups

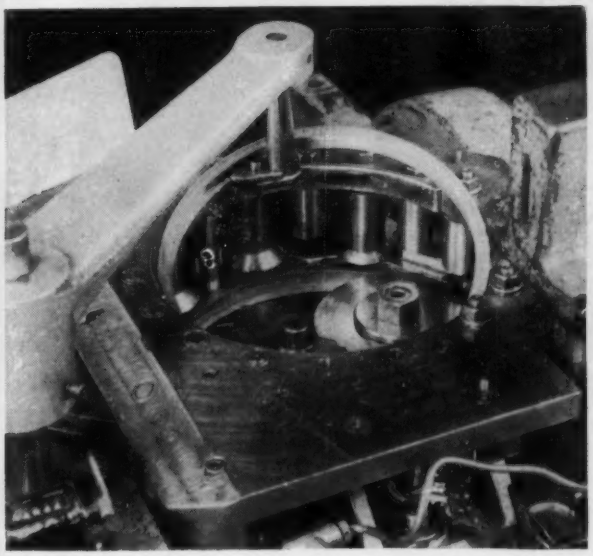


Rings are made on slide machines



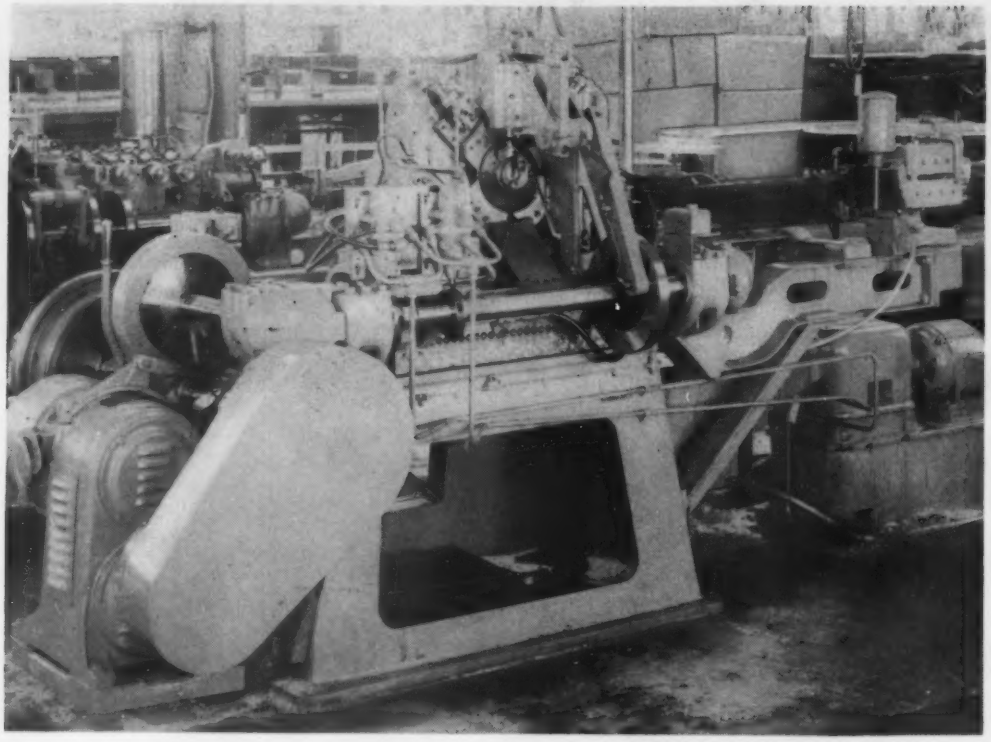
LOOP FEEDER . . .

Stainless 430 rings which hold on glass-meter covers are made from flat stock in a #33 Multi-Slide. The flanges are rolled on, the ring formed, and various slots and holes pierced in a single machine. Material is received in coils which are mounted on a horizontal stock reel. Stock passes through the selsyn-controlled takeup loop at upper right, then into forming rolls. As the machine feeds enough stock for one ring, it draws it from the loop. Otherwise, because of the long feed, an unusual demand would be placed on the reel. A selsyn control replaces the stock in the loop before the next cycle. Thus the stock reel can feed smoothly, without the sudden drag occurring when the stock is pulled into the machine. Reels on this machine are cast aluminum, but ordinary bicycle wheels were used on a second machine at less cost and just as successfully



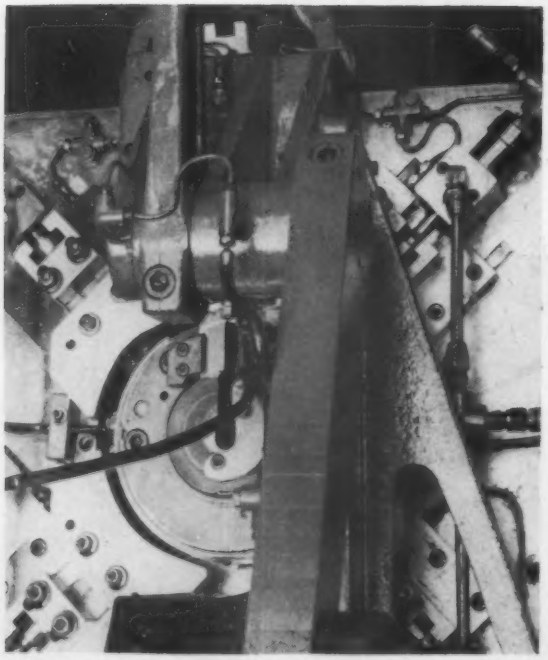
DOUBLE-FLANGE RING . . .

Because of the double flange, ejection is somewhat of a problem when the cover ring is completed. Here is the head of the Multi-Slide and a closeup to show ejection. After the strip becomes a channel and is punched, it is cut off, then fed into the nest of forming rolls. An ejector arm actuated by the side drive shaft swings down to catch inside the channel and lift it out, then tosses it into an ejection chute. Production is 80 per min, so the ejector clip does not need to grip the ring at all

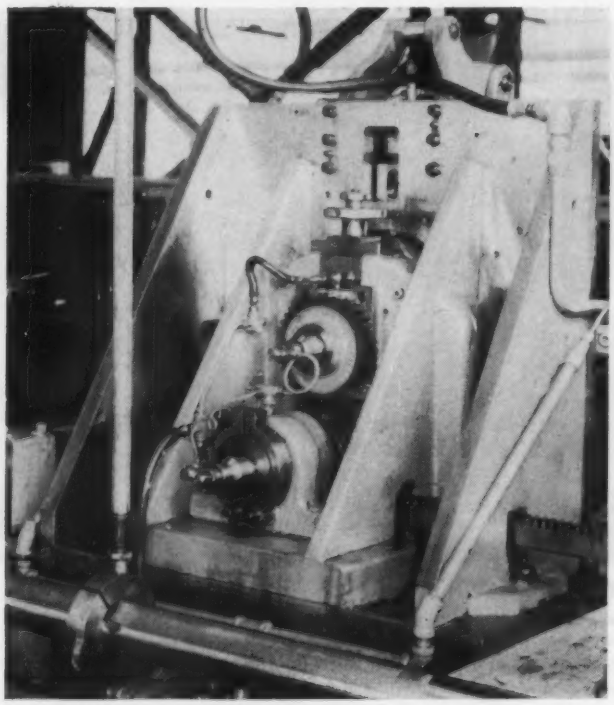


SINGLE-FLANGE RING . . .

A simpler, single-flange ring of the same material is made in a vertical die. Feeding is like that on the double-flange job, but no ejection is required — the part simply slides off a chute to a tote box. Here is a general view of the machine, plus front and back closeups of the forming die. Note that in this case the formed stock is fed around a central drum by three forming shoes actuated by air cylinders. The drum itself is gear-driven from the back, so there is no obstruction to removal of the ring



FRONT



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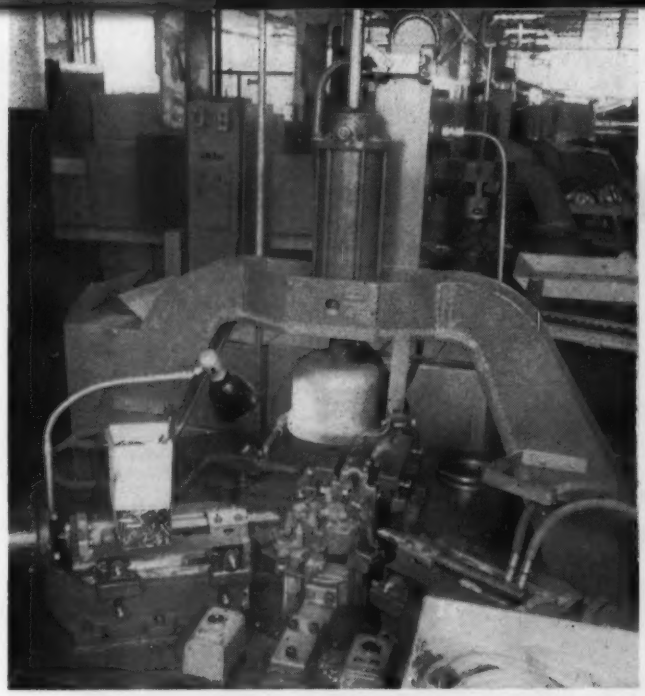

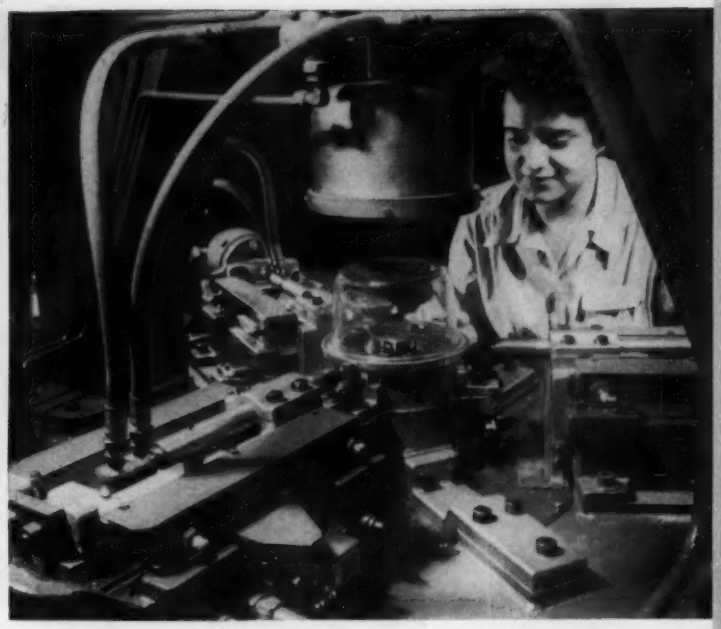

FINISHING THE RING . . .
Rings are attached to glass covers in a Thomson 3-head welder. The operator puts three formed clips in holders on the central pedestal, places the glass cover over it, and puts the ring around it. Then all three welding electrodes move in at once for a timed welding cycle. Clips thereafter hold the ring on the glass. A rubber gasket will later seal the cover to the meter, the assembly being held tightly by a lever takeup latch on the socket ring . . . Girls who do assembly soldering or welding, incidentally, are certified for specific jobs. Tests given are the Army-Navy welding specs

Visual inspection is common

VISUAL CHECKS . . .
Most steps in assembly are checked, and adjustments made, under visual magnification. Here an operator checks gear runout or end shake on the register gear and shaft. All she need do is see that it is within limit lines on the screen. The projector enlarges the image 30 times. These units replace involved and inaccurate mechanical checks

CHECKING SHAFT ASSEMBLY . . .
Here is another visual setup for checking disk and shaft runout. On the screen, both the outer end of the shaft and the edge of the disk are projected at 30 to one. Thus the operator can determine at a glance whether the two are within scribed tolerance lines. This setup replaces a very fatiguing mechanical test

CHECKING THE COIL . . .

Lag characteristics of the meter coil are checked by placing it in a gate fixture and swinging it to left into a meter frame. This combines visual examination of the coil and a test of the characteristics. Adjustments are made by nipping between punched holes on a lag plate. The lower projector actually indicates how many slots are to be cut, and the operator can simply swing the gate to right and set a control which automatically nips the required number of barriers between holes. A re-check is made by swinging back again

VISUAL GEAR-MESH SETTING . . .

To set mesh between the worm shaft and the driven gear on the meter register with extreme accuracy, a low-cost and flexible miniature projector is used. Mesh profile is projected on the screen, which carries engraved tolerance limits. The operator makes her adjustments while seeing the projection at 30 to 1

BUILT-IN SCREWDRIVER . . .

Disk height between drag magnets is set by positioning the guide shells and locking with set screws. The meter body is held into an automatic fixture by an air latch (top), then screwdrivers on swinging arms are brought in to loosen set screws, the disk positioned by visual inspection on a projector and the screws tightened. Note projector hood at left

DRAG ADJUSTMENT . . .

A step in meter calibration is to check drag on the disk by damping magnets. This is done by strengthening or weakening the degree of magnetization of these magnets. The body assembly is clamped in a fixture and a hinged crescent-shaped hood brought down to protect the magnets in the top bearing shell. Then drag is checked and changed as required by pushbutton control of the coils. The actual check is made by a stroboscope (screen at top center) comparing the test meter and a standard

HERE IS THE APPRENTICE SHOP . . .
. . . at Somersworth, where each man spends his first year

Unique shop-apprentice system supplies supervision

Somersworth has an unusual tool and die maker apprentice program that offers two years of college credit towards a BSME degree at the University of New Hampshire. This is typical of the training program that supplies necessary skills for the plant, and is viewed realistically as a prime source for management talent.

Started in 1949, the program takes twelve high-school graduates a year from competitive examination. Only first-year men work in the apprentice shop; thereafter they work in the toolroom or other areas of the plant. All work is of course selected to prepare the apprentice for successful completion of his course.

Eight periods of 1000 working hours each comprise the course, broken down into 6,640 shop hours and 1,360 classroom hours (10 hr per week for 34 weeks per year). Instructors from the University of New Hampshire (in Dover, 11 miles away) come to the plant to conduct standard classes 10 hr per week in the plant. All texts, equipment and other aids are like those at UNH. In addition, GE personnel conduct a course in industrial management, so of the classroom work, 1224 hr are UNH credit work (75 hr of the required 144) and 136 hr are in management. Apprentices are paid their standard hourly rate while attending classes, and given their books. They buy their own tools, slide rules, and drafting equipment.

SELECTION OF APPRENTICES

Apprentices are selected from high-school graduates with backgrounds preparing them for entrance exams in algebra, trigonometry, plane geometry, and physics. Exams are given late in April each year to boys between 18 and 21 years of age, or veterans up to 23 years. Those who complete the course receive a certificate, a pin, and a $100 bonus, then are

UNH PROFESSORS . . .
. . . come to Somersworth for classes from 8 to 10 AM in a classroom equipped like those at the University itself

eligible for the company-wide GE Manufacturing Training program or to continue their college study towards an engineering degree.

Actually, management at Somersworth considers these graduates as its best supervision material, and encourages this kind of thinking on the part of the apprentice as well. He can, if he wishes, become a skilled craftsman, but the way is also open to engineering or further in-plant management training. The result has been that a number of apprentices have passed into management, and some are currently completing their college courses.

College Courses Taken by Apprentices

Algebra	Mechanics
Trigonometry	Freshman English
Analytic Geometry	Kinematics
Calculus	Thermodynamics
Engrg Drawing	Machine Design
Physics	Report Writing
Metallurgy	DC Circuits & Magnetism
Economics	AC Circuits & Fundamentals of Electronics
Machine Drawing	
Industrial Management	

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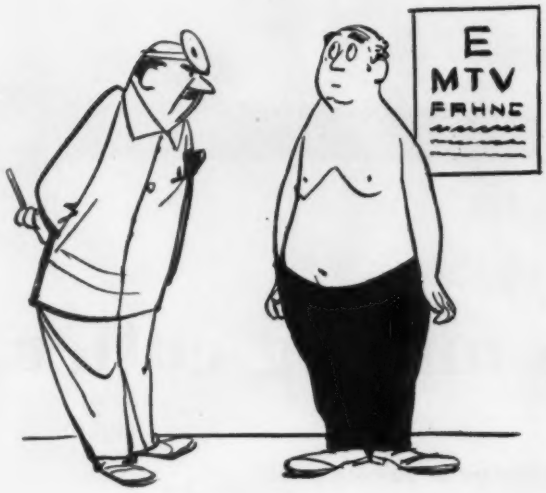
Round Table



Check up or check out

"How do you like these compulsory health examinations, Al? Looks to me like the company's invading our rights of privacy."

"I don't agree, Ed. I think it's a fine idea. For one thing, it proves the company is interested in keeping us around for as long as possible—in good shape."

"It proves they don't want us to get sick, but I can't see that it proves much else. I resent the fact that it's compulsory. I figure it's my own business when I see the doctor."

"Maybe so, Ed, but it's also the company's to see that you're in the pink as much as possible. They don't get much supervision out of you when you're home in bed with the flu."

"That's my worry, Al. If I get sick too often they can still fire me and look for another man. I just don't like the idea of my private medical records spread out for every Tom, Dick, and Harry in Personnel to read—my health is my own business—no one else's. And I figure if something's wrong, what I don't know won't hurt me."

"Look at it this way, Ed. To the company, you're an investment just as important as plant and machines. A man who thinks he's in good health, but isn't, can hurt the morale of everybody in the shop. Think what it means to *you*. A checkup can catch a lot of things you wouldn't know about—things that could be plenty serious if you let them go."

"Look, let them give me a raise and I'll take care of my own checkup. Actually I do anyhow."

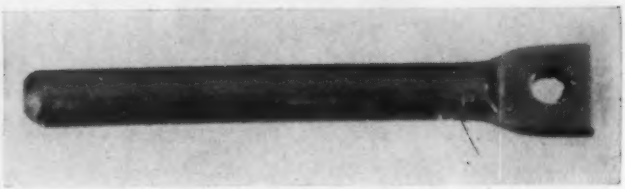
"But Ed, periodic examinations for foremen and executives are strictly diagnostic. If there's any thing wrong with you, the examining physician tells you about it. Then you see your own doctor if you'd rather have it that way."

"Yeah, but look at it this way, Al. I'm no chicken. I'm getting near retirement age. Suppose they find I've got a heart condition and can't keep up with shop work? I can't afford to lose my job. I've got a family to support. I don't want to be laid off with a partial disability pension instead of full retirement pay."

"I admit it's a tough problem, Ed, but it looks to me like you'd have no choice. It'd be a lot better for you to check up, no matter what the doc finds wrong, than for you to check out suddenly."

***SHOULD** a man's health be his own affair? Or is it up to his employer to safeguard it? What about the foreman or executive whose checkup reveals he has a chronic disease that prevents him from holding down his job? Your opinions on the subject may help others. Discussions of earlier topics start on page 188.*

Stages of work . . .
At last stage—cutoff—milling cutter is fed in by cam on side of die, cutting radius on the end of the work



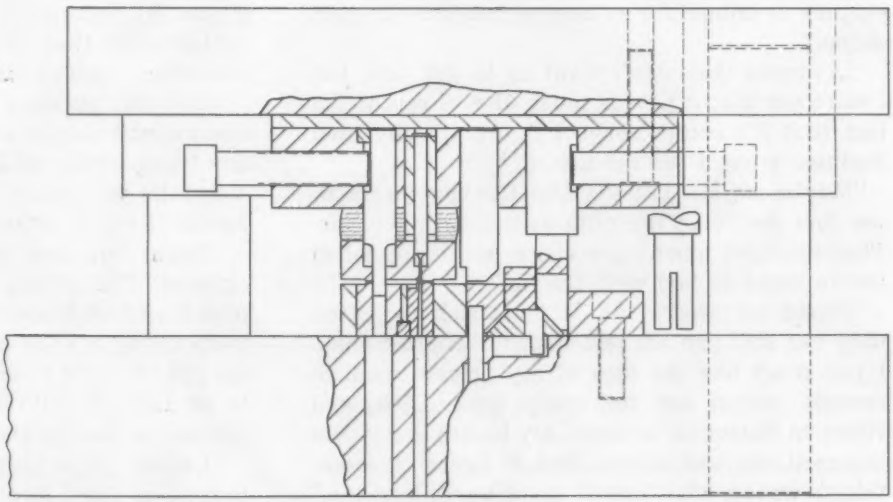
Enlargement of part (about 10x), showing radius required on the end of the work. Wire diameter is 0.039 ± 0.0005 in.; length, 0.375 ± 0.005 in.; flat is 0.019 ± 0.002 in. thick, with 0.020-in. hole. Nose must have full radius. Most companies which bid on this job planned to do the radius as a second operation on lathe

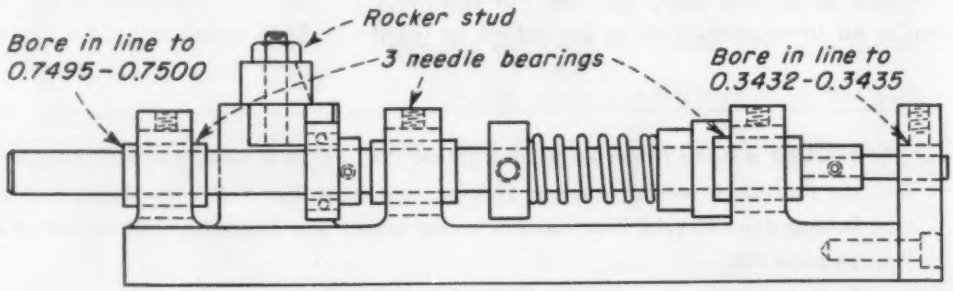
Punch-cam feeds milling cutter

Hollow-milling was the economical answer to the problem of putting a full nose radius on the end of this small brass part. A 3-stage progressive die blanks the flat and punches the 0.020-in. hole. At the last stage, a cam on the punch-holder feeds a hollow-milling cutter forward, cutting the nose radius

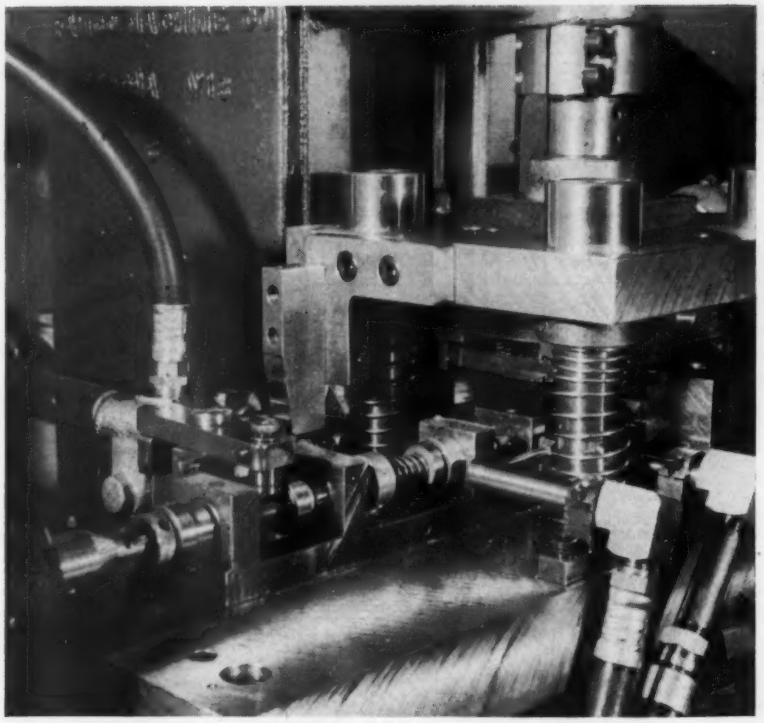
STUART E WADSWORTH, HASKELL ELECTRONICS & TOOL CORP, HOMER, NY

Die design . . .
Note cam action which moves lower punch up as upper punch comes down when forming both sides of the flat on the work



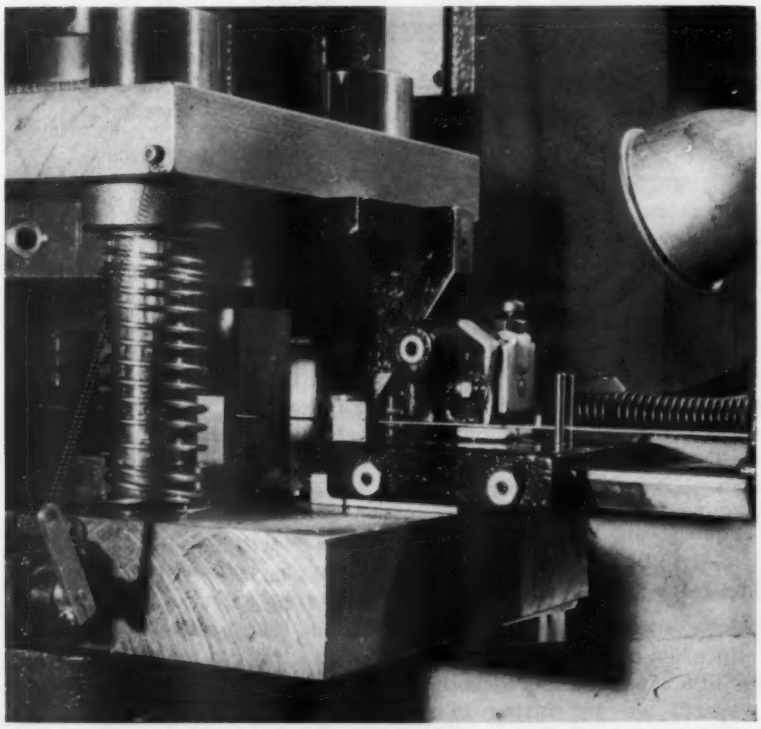


Details of milling spindle . . .
Rocker stud shown here is not attached to spindle, but is part of an arm which pivots to move cutter assembly in and out



Setup, left side . . .

. . . with 10,000-rpm motor which drives the milling spindle. Note rocker which is actuated by cam on punch plate, moving cutter forward and away from work with each stroke of the punch. Hoses on front of the die are for air-ejection and to blow chips away from the milling cutter

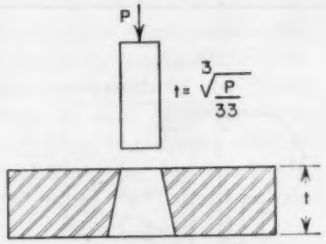


Setup, right side . . .

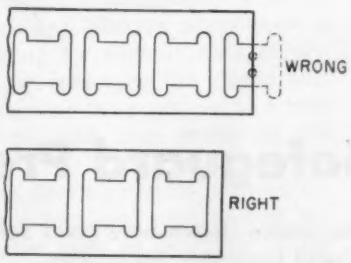
. . . showing automatic feed and wire guides. Production rate is 35 parts per hour, although die has run as many as 60 pieces per hour. Cycle is automatic

Diemakers' Kinks

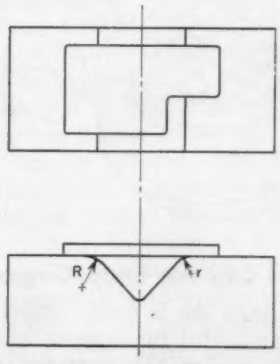
FEDERICO STRASSER



DIE-PLATE THICKNESS is difficult to determine mathematically. If no existing tools are available as a guide, the die-plate thickness may be calculated from the formula $t = \sqrt[3]{P \div 33}$ where t is the die-plate thickness, in., and P is the cutting pressure, lb. Example: P = 12,000 lb, and t figures out to be 0.7 in., or ¾ in. approximately.

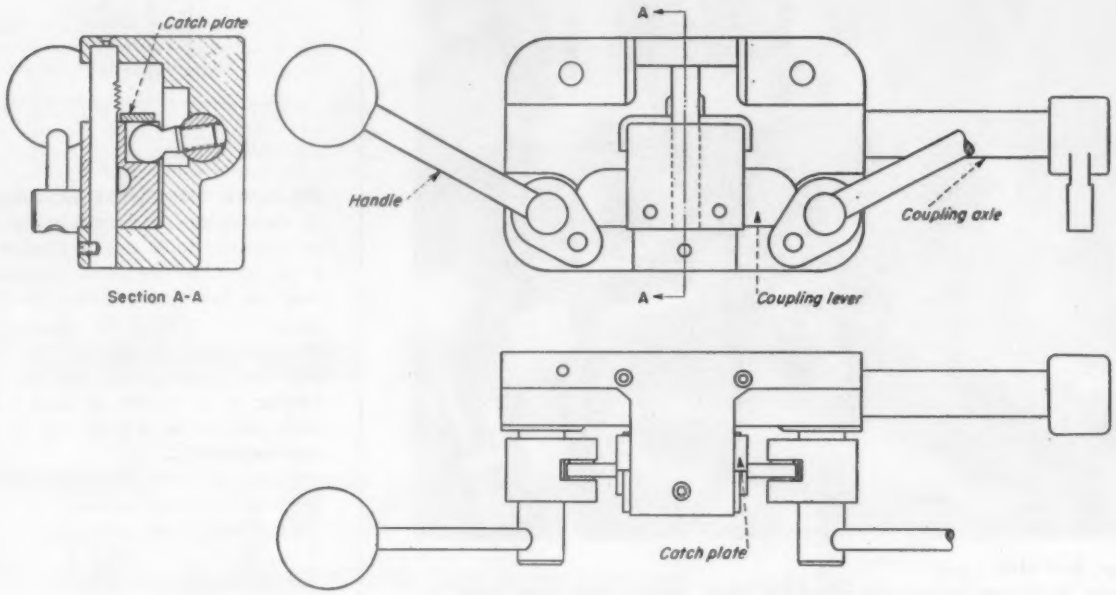


INCOMPLETE HOLES should not be punched in progressive-die operations. Slender piercing punches, for example, can be pushed to one side (the direction of least resistance). Therefore, the strip length should be worked out so that no partial holes are cut at the end.



BENDING OF BLANKS with unequal legs often causes trouble. The wider leg has more friction against its bending edge. To overcome this condition apply more radius to the bending edge under the wider leg.

Practical Ideas . . .



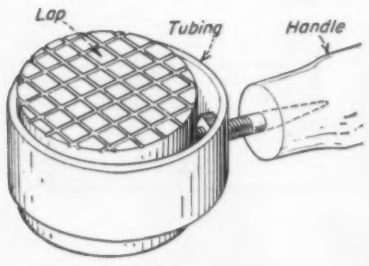
Safeguard Press Operators' Hands

The device shown here gives safe 2-hand protection for presses.

When the machine operator pushes the two handles downward, a coupling and shaft slide up, transmitting motion through the coupling to the coupling axle.

If only one handle is pushed down, only one of the two coupling levers is moved, so the coupling is wedged against the shaft, and no motion is transmitted.

If an operator tries to turn the coupling axle directly, the coupling swings up against the shaft, and stops against the small grooves milled in the shaft. *Hjalmar Dahl, Upplands Vasby, Sweden*



Hand Lap For Snap Gages

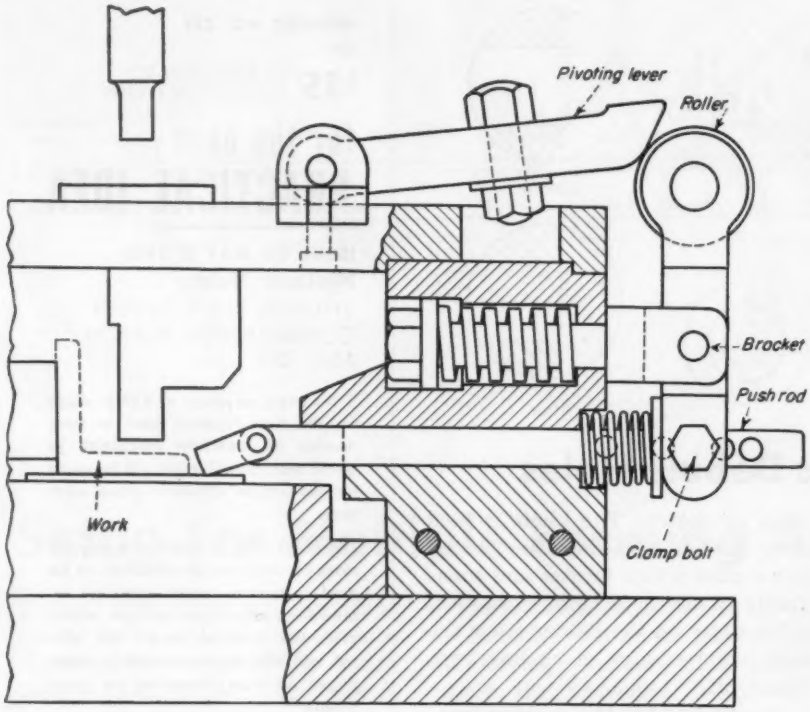
This hand lap is easily made, and is very useful for lapping in snap gages, where the surfaces must be kept parallel. A piece of 2½-in. tubing, about ¾ in. long, is drilled for a ¼-in. screw, one end of which is tapered and driven into a file handle. Then a cast iron plug, about 2-in. diameter, is ground parallel and crisscrossed with a waffle pattern.

The oversized tubing allows the lap to swivel, so it follows the surface being lapped, and does not round off the edges of the gage. A countersunk hole in the lap keeps the setscrew from drifting out of place. The lap should be turned over every so often to equalize wear. *S J Oravec, Detroit, Mich*

Reflection Helps Gage Shaft

Our work is mostly experimental, and we often have to file a few tenths or even a half thousandth off a shaft we are fitting to a recess. Sometimes the shaft is fairly long, and it is hard to make an accurate cut of so small a dimension. We have found from experience that if there is a long fluorescent light over the lathe bed, with its axis exactly parallel to the bed, the light reflected from the shaft indicates the trueness of the filing job. The larger the diameter of the work, the wider the reflected section will be.

Because the sides of the reflection on a shaft which is of uniform diameter, will be parallel, it is relatively easy to note any variations from size. After a little practice, it is possible to pick up high spots and touch them up to very close limits, simply by noting the shape of the reflected light. *William P Murphy, Jr, director of research and development, Dade Reagents, Inc, Miami, Fla*



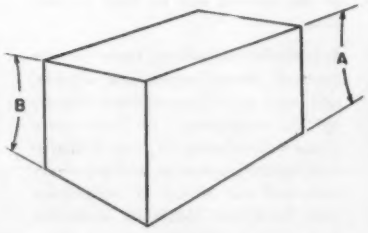
Piercing Punch For Angle Iron

Variation in stock dimensions made it hard for us to locate angle iron for accurate punching of holes when the critical distance was measured from the corner side of the work. To set up for this work, we have made the fixture shown here.

As the piercing punch approaches the die, a small projection on the punch holder forces the pivot downward, pushing the roller outward. This action causes the hinged lever to move the push-rod in toward the work, thus holding the angle block against the locating block.

Because the bracket is retained by a heavy spring, any variation in material width is allowed for by the spring. Also, an adjustment is available for various sizes of angles, by removing the clamp bolt and moving the push-bar to a new position, and then replacing the bolt.

This device provides positive automatic location, even though the operator may be working at the extreme ends of press guides. *R J Every, Kent, England*



Rule for Setting Angle Plate

This formula is simple, yet accurate for setting compound-angle plates. When machining or grinding a compound angle, it is necessary to make a correction when setting the second angle, because of loss of distance when the first angle leaves the vertical plane. The formula to use is:

$$\tan a = \text{Cos } B \times \tan A$$

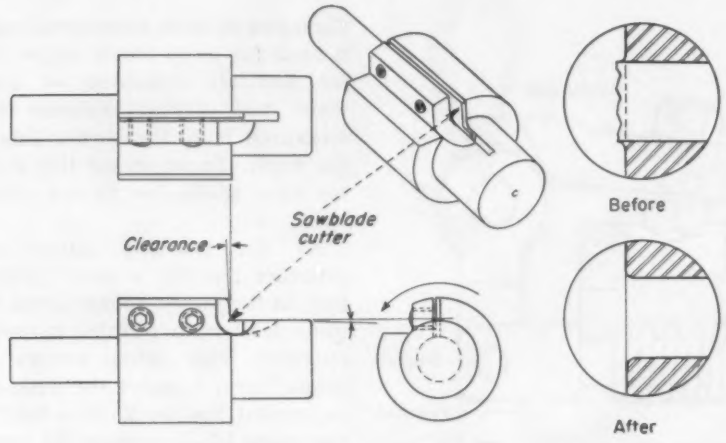
where *A* is the required angle, *B* is the first angle set on the sine plate, and *a* is the second angle set on the sine plate, to generate angle *A*. *Otto A Schlaedlich, Poughkeepsie, NY*

Boric Acid Protects Dies During Quenching

In practically every oil quenching tank there is a layer of water on the bottom of the tank, formed by condensation. If hot parts hit this water, there is a good chance of warping, cracking, or even irregular hardness resulting in the work. For years we tried to cure this problem, and finally cured it with fused boric acid, which has a strong affinity for water in the presence of oil.

To make fused boric acid, we buy about a pound of ordinary boric acid (from a drug store) and put in a can that will fit into a furnace. (A clean gallon can filled about three quarters full makes a good combination. *Important:* Be sure to put a piece of sheet metal on the floor of the furnace, in case the acid spills over.)

The powder is heated to about 1300F, when it is a heavy liquid, which can be poured into the tank. This makes a glasslike substance which readily absorbs water. As it takes on water, it turns white and dissolves completely. We recently emptied a 15-gallon tank that had been in use for more than four years. The boric acid was white, but there was still enough for many years. And out of many hundreds of pieces we quenched in this tank, we warped or cracked very few. *J H Sperman, Sperman Metal Specialties, Brooklyn, NY*

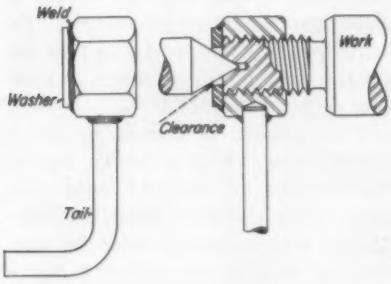


Scrapped Saw Blades Deburr Holes

When deburring with conical tools, we were having trouble because the tool would clean up the edge of the hole, but would sometimes throw up one burr into the ID of the work, and another on the outer edge. This meant that when mounting the work on an arbor, we would get runout or have trouble getting the work over the arbor, and the burrs would have to be scraped out by hand.

These troubles were overcome by making radius-cutting tools from broken hacksaw blades, in which we had ground a small radius, as shown. The blade is held in a special slotted holder which has a pilot which locates and turns freely in the hole being deburred. A shoulder on the holder stops the tool when enough stock has been taken off.

Regrinding the tool is done freehand on the corner of an emery wheel. Actually, though, it is easier to keep a supply of sharp blades on hand. These can be ganged up in a jig or vise, and ground together with a few passes on a tool grinder. *George O Mercer, Jr, Christiana, Penna*



Threaded-Work Driving Dog

Machinists often use a split nut and common dog for driving threaded work on lathes or cylindrical grinders. This is all right for a few pieces, but is rather slow for production runs. The device shown here is easily made, and is much more quickly changed from one piece to another.

A standard hex nut has a washer brazed on one end, and a piece of round stock is brazed into a hole on one of the flats of the nut. This rod is then bent to form a driving member.

The washer should seat against the end of the work when the nut is screwed on, and the hole in the washer must be large enough so it does not touch the center at the machine headstock.

To loosen the nut for removal, it is only necessary to give the dogtail a sharp rap with a hammer to loosen it. It can then be spun off the work. *H J Gerber, Stillwater, Okla*

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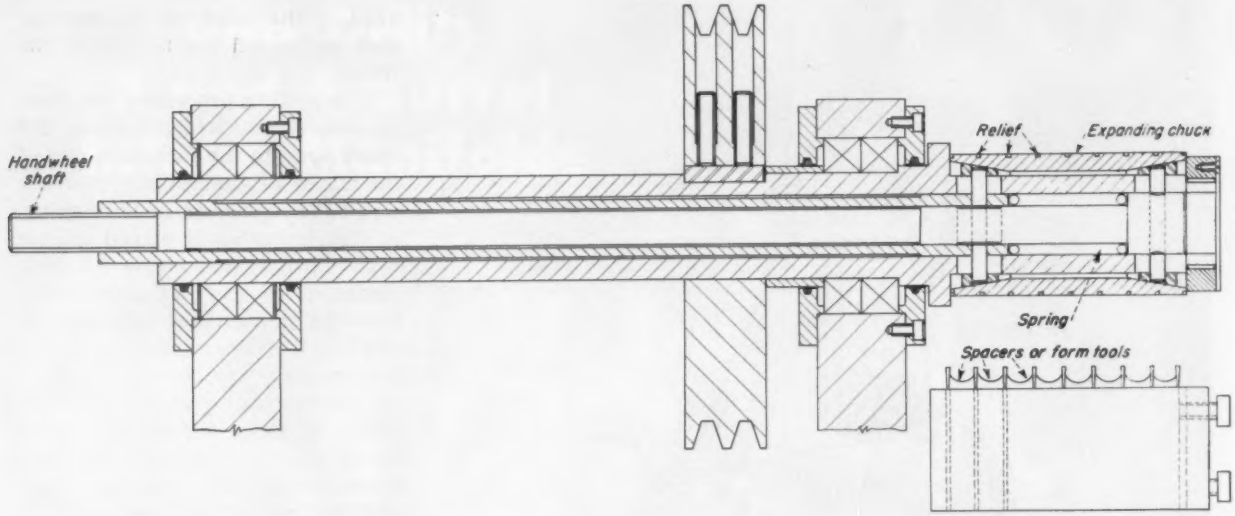


Setup For Multiple Forming And Cutoff

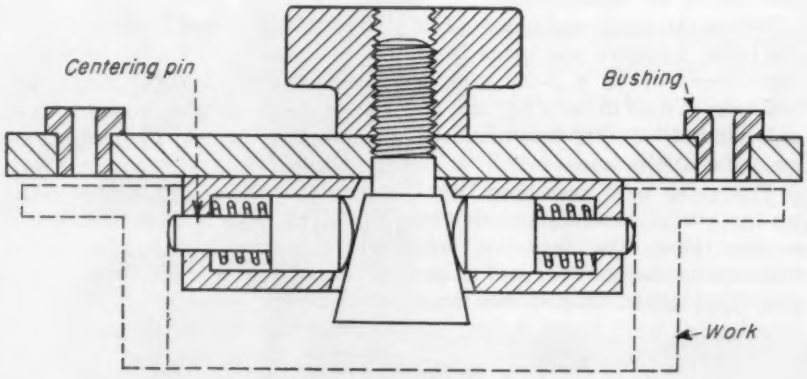
Several thin parts can simultaneously be formed and cut off with the setup shown here. The device can be used either with a lathe, or a special machine.

The basic part is an expanding chuck, over which a sleeve of the material being cut is slipped. The chuck has a number of longitudinal slots, provided as clearance for the cutoff tools.

The chuck is expanded by turning a handwheel at the left end of the device. Turning this wheel causes the draw-bar to retract, pushing in the sleeve. This causes two tapers to draw together, expanding the chuck. Rotating the hand wheel the other way releases the pressure, and springs force the tapered rings apart.

Forming tools act as spacers between the standard cutoff tools. If only cutoff is desired, without forming, spacers can take the place of the form tools.

The number of cutoff tools that can be used at once is limited only by the material being cut, and the power available. We have frequently used a setup with eleven tools. *P V Dunn, Hillbrow, South Africa*

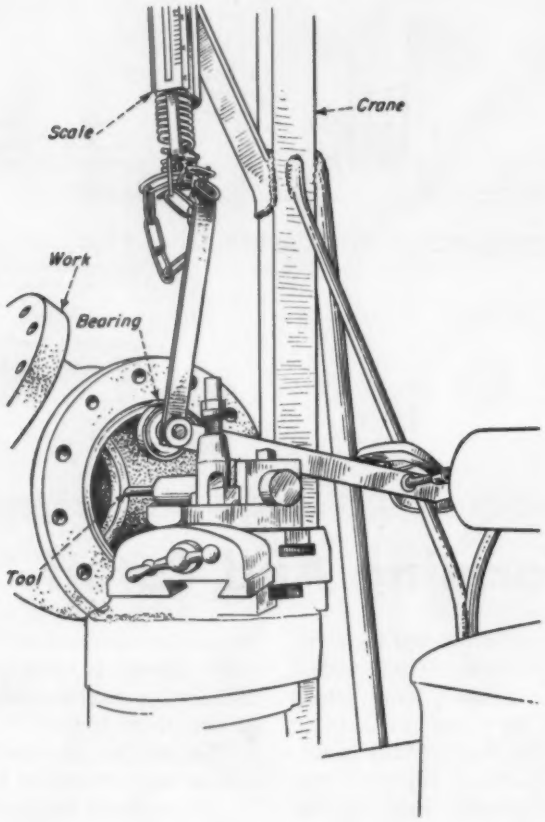


Self-Centering Drill Jig

Drill jigs for large work are often made to fit over the work, rather than having the work fit inside the jig. Such a device is shown here. To help locate the jig centrally, to drill eight holes equidistant from the center of the work, there is a special self-centering feature built into the fixture. The smaller of two disks enters the workpiece hole, and the larger disk contacts the upper surface of the work flange. A handwheel nut is tightened by a screw, and the conical surface moves upward, forcing steel pins outward until they contact the work. The jig is thus automatically centered. A little more pressure on the pins tightens the work in place and drilling is started.

After machining, the nut is loosened, and the screw is pushed downward. Springs retract the pins, and the jig is then easily removed from the work. *Federico Strasser, Santiago, Chile*

Practical Ideas



Ice Scale Helps Machine Valve

The setup shown here was successfully used to narrow and true up the seat rings in several 8-in. valves, machined on a 16-in. pattern lathe equipped with rising blocks.

After disassembling and cleaning the work, the valve body was placed horizontally on a bench with the outlet face down. Then the inlet flange was slightly raised on a block, a 400-lb ice scale was hooked in a bonnet hole, and the scale was pulled up (with a small crane) until the outlet flange just cleared the bench. The reading on the scale gave us the outboard weight of the valve body.

The next step was to put a lathe faceplate face up on the bench. With the help of shims, squares, and dial indicator, the valve body was placed on the faceplate so the bonnet face was true to the plate. Then the position of the valve was carefully scribed, and the size and location of shims was recorded, so the work could be bolted in proper position in the lathe.

Before the work was mounted in the lathe, a square was made from two pieces of ¼ x 2-in. iron, a hole was drilled in each leg, and an annular ball bearing was mounted on a pin at the knee.

The valve body was then lifted on the portable crane, and moved to the lathe. The faceplate was fastened to the spindle, and shims placed under the flange in the same locations as were found during the setup on the bench.

The ice scales were hooked into one leg of the makeshift square, with the ball bearing running within the bonnet aligning recess. The free end of the hanger was flexibly clamped against the frame of the crane, making very sure that the ball bearing was biased toward the head of the lathe, so the bearing toed in toward the bottom of the recess.

If mounting procedure has been correct, after firmly bolting the valve body to the faceplate, one of the other of the spindle journals will have raised out of its bearing. A dial indicator is placed on the high journal, and crane lift tensioned until the indicator shows that the journal has bottomed. A reading is taken of the scale, and bearing caps are bolted into place on the machine spindle. The face plate is then turned by hand, checking it for freeness. Final adjustments are also made for bringing the bore of the seat ring into concentricity.

Counterbalance weights are bolted to the faceplate, and the compound rest is set for the proper angle. Light cuts are taken across the face of the seat ring until nearly all the bevel has disappeared, making sure that the ball bearing does not run out of the recess. Then, using the compound rest, cut the bevel to its proper width.

The lathe should, of course, be run in lower back gears, to prevent whipping or chattering. *J H Jobson, General manager, National Valve & Fittings Service, Gaffney, S C*

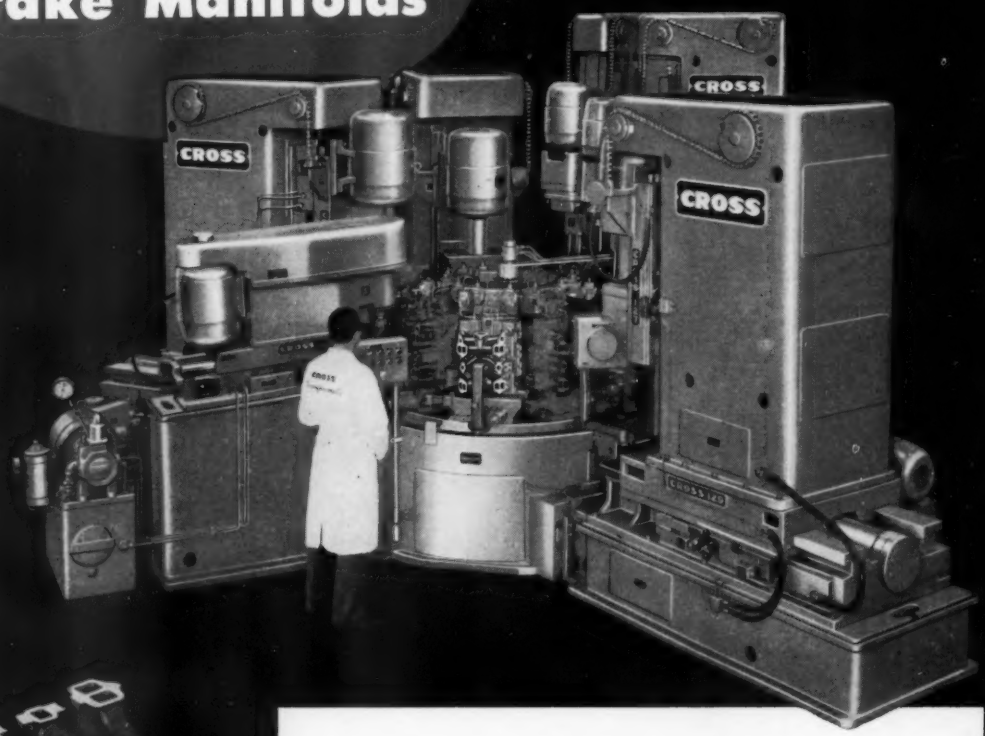
Threading Sheet Metal

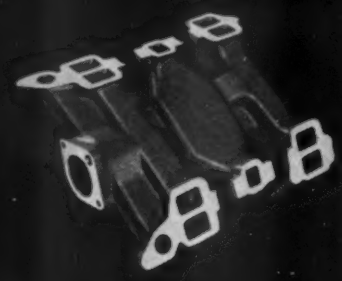
It is often difficult to make a threaded hole in sheet metal, because the work may be too thin to take a full thread. In these cases, a hole can be drilled in the sheet, about two-thirds required nominal size. This hole is then opened out with a tapered steel rod, rotated in a brace. This method throws up a burr which increases the depth of stock which can be threaded. *W E Warner, Essex, England*

Translucent plastic bottles make excellent lubricators, because they can shoot more lubricant per squeeze, and the oil level is easily seen through the bottle. Also, they are acid-resistant and unbreakable. *T Kikuchi, Osaka-Fu, Japan*

Mills and Drills 2 and 4 Barrel Intake Manifolds

Another Special by Cross





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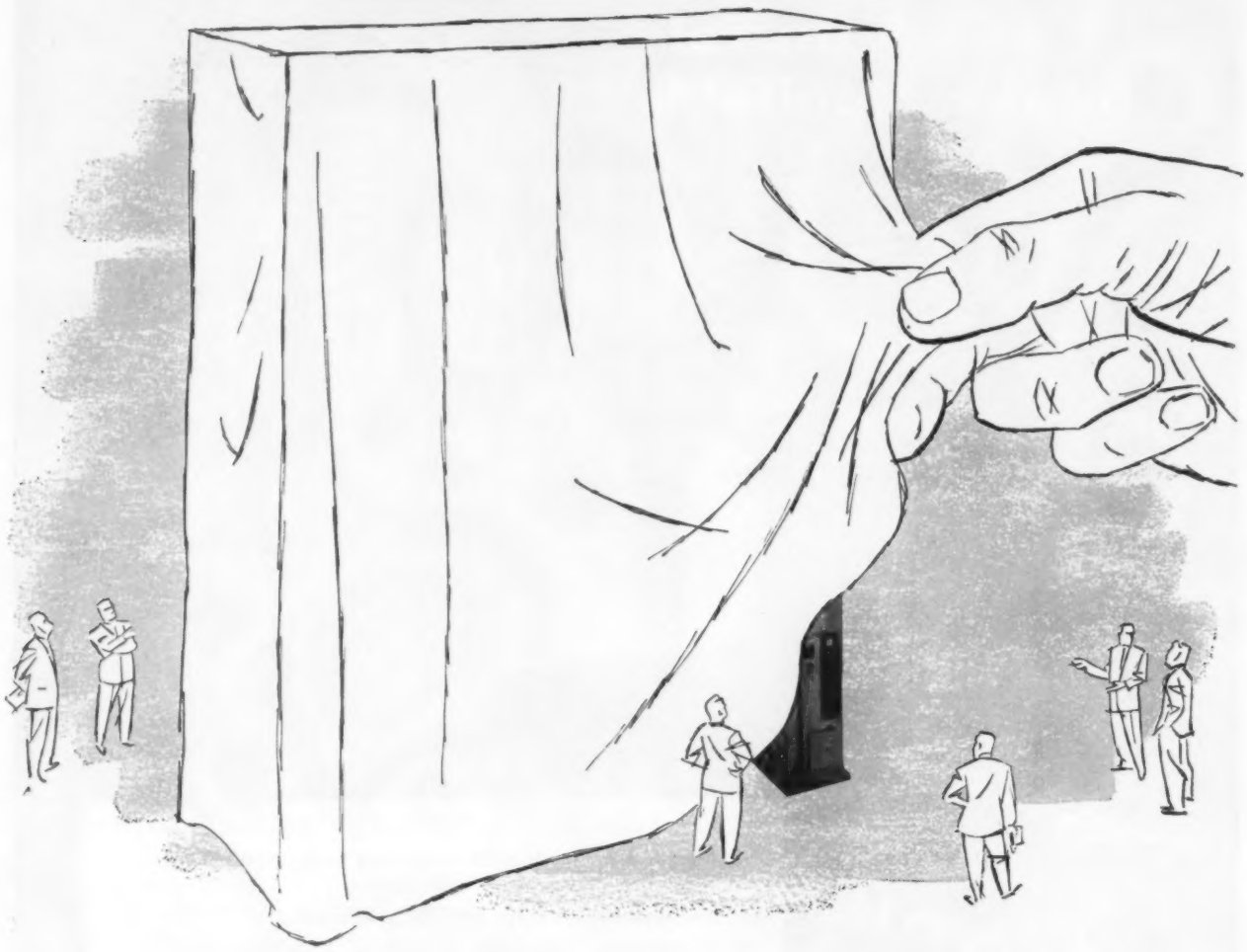

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PROPELLER-AGITATED QUENCHING...IV

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EFFECTIVENESS OF QUENCH BATHS

To illustrate the advantages of correctly engineered agitation of a quench bath, the following data on the quenching of 9x9x11-in. die blocks are presented: Die block No. 1 was quenched from 1550 F in propeller-agitated oil, No. 3 in still oil, and No. 2 in a tank where mild circulation was afforded by pumps. Bath temperature for blocks Nos. 1 and 3 was 140 F, and for No. 2, 110 F. Tempering temperatures were 1000 F. Fig 5 shows the rate of cooling at the surface of each block.

The times required to reach the calculated M_s temperature (start of martensite formation) of about 500 F at the surface and at the center of these blocks were:

Die Block, No.	Time to Reach Ms Temperature Min. Surface	Center
1	13⅓	23½
2	22	28
3	30	33½

Fig 6 shows the comparison in mechanical properties obtained.

Another approach to comparing the heat-extracting power of still oil and of properly agitated oil is that of determining the depth to which hardening occurs in rounds of various sizes and of various grades of steel. Results of hardness tests on an AISI 1080 steel and an AISI 4140 steel are shown in Fig 7 and 8. It is obvious that agitation has improved the depth of hardening in each instance.

Heat-extracting power of quench baths can be measured in terms of the mechanical properties obtained. Work was done on AISI 1050 steel in four sizes: ¼-, ½-,

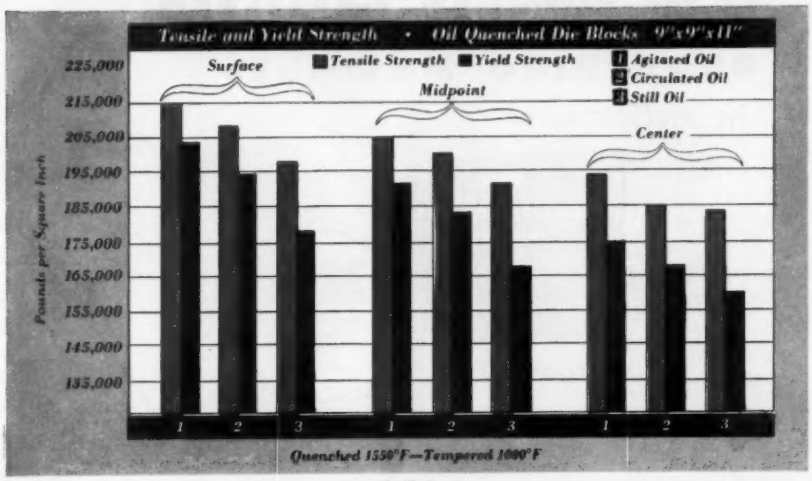

FIG 6

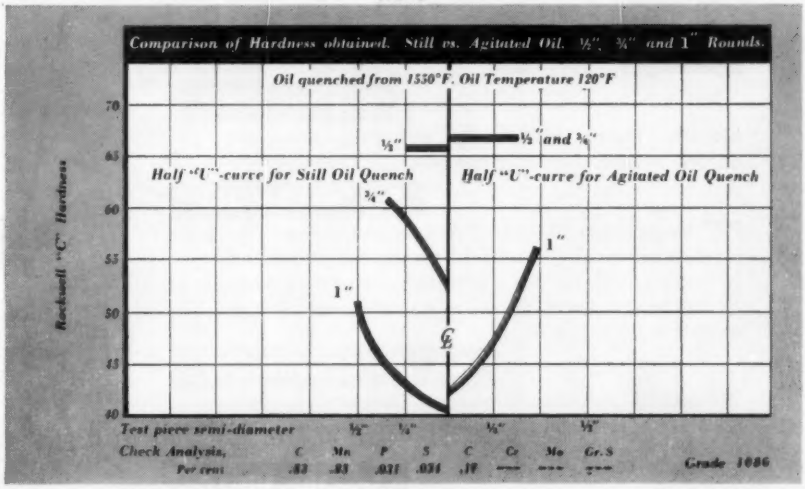
Comparison of Hardness obtained. Still vs. Agitated Oil. ½", ¾" and 1" Rounds.
Oil quenched from 1550°F. Oil Temperature 120°F
Half "U"-curve for Still Oil Quench
Half "U"-curve for Agitated Oil Quench
½" and ⅜"
¾"
1"
Rockwell "C" Hardness
70
65
60
55
50
45
40
Test piece semi-diameter ½" ¼" ⅛" ½"
Check Analysis, Per cent C .83 Mn .83 P .031 S .034 C .97 Cr --- Mo --- Gr.S ---
Grade 1086

FIG 7

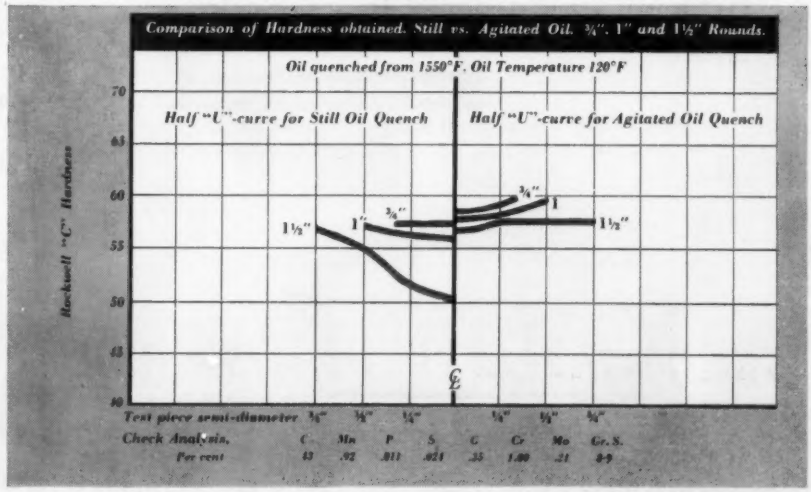

FIG 8

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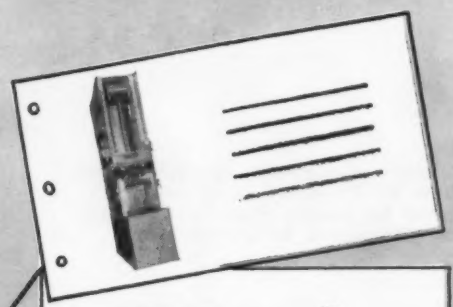

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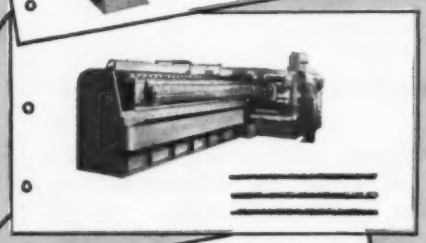
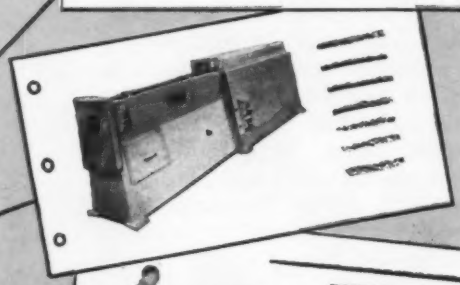


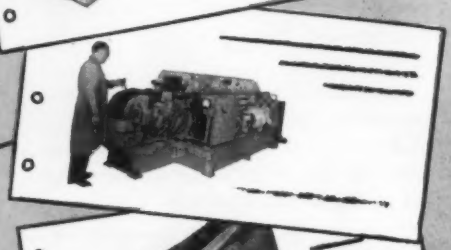
See the SRHE

Electric Drive Horizontal machine: broaching jet engine turbine discs at a speed of 280 feet-per-minute!*



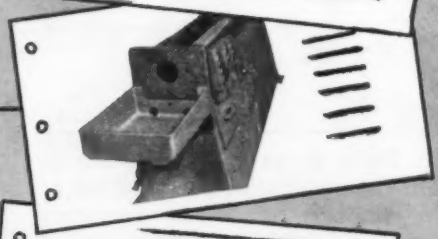
See the SPECIAL

72" Horizontal Electric Drive machine: the first of its kind for internal or external broaching. This machine is broaching involute gear sprockets, a surface broaching operation on sprocket, with 25 teeth, at rate of 25 complete parts per hour.



See the CONTINUOUS

Broaching machine: broaching automotive connecting rods at the rate of 1200 parts per hour, using 24 fixtures per machine.



See the HP-10

"Toolroom" broaching machine: broaching standard keyways in gears. (A small, universal machine, 48" stroke.)

See the SHARPENER

with micro-feed attachment sharpening and backing off all types of broaches. 36" size, with high speed spindle.

* The fastest broaching operation ever performed . . . finish-broaching more than 235 "pine tree" slots per hour!

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

PROPELLER-AGITATED QUENCHING...V

¾-, and 1-in. rounds. The grain size was ASTM No. 7 to 8.

Bars of this steel were quenched from the austenitizing temperature into still oil and into propeller-agitated oil, and tempered at 600 and 900 F. Mechanical properties are illustrated by Fig 9. Studies of microstructures, Figs 10 and 11, demonstrated the advantage of quenching in a properly agitated bath; that is, martensite formed to a greater depth in bars quenched in an agitated bath than in bars of the same size quenched in an unagitated bath.

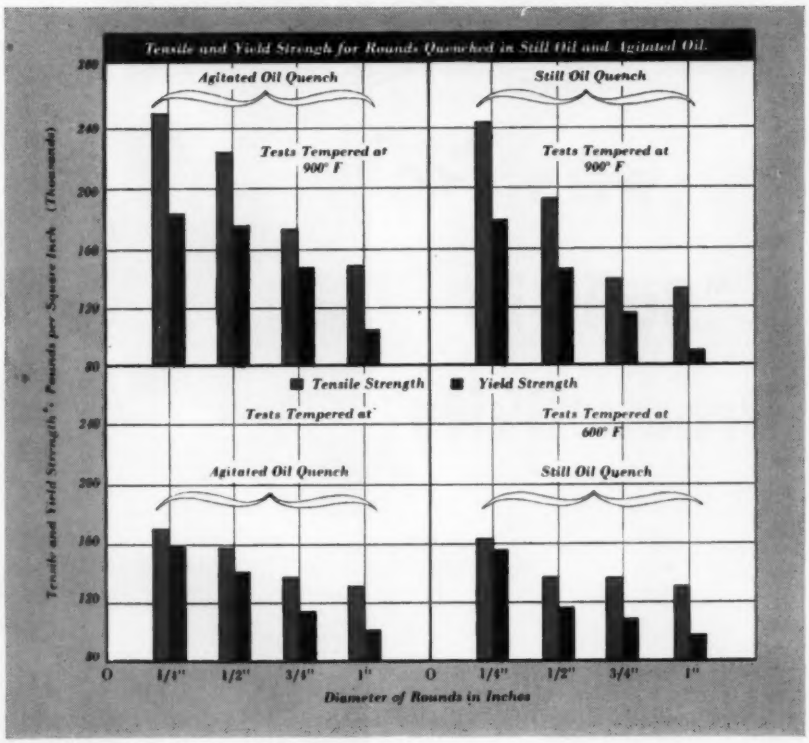


FIG 9

GENERAL RULES

The following rules are purposely worded in general terms because technical advances in agitator design and the special considerations often necessary for a particular job require a certain degree of flexibility in engineering any given installation.

1. Cooling the Quench Baths

Propeller agitation will distribute the heat throughout the bath and keep the bath at nearly uniform temperature, but cannot remove any considerable amount of heat. For quenching only two or three batches per day, no extraneous cooling of the quenchant is needed.

However, it is desirable to maintain oil quench baths at about 130 F. One way is by cooling-water coils around the tank walls. A thermostat actuating a solenoid valve may be used to control water flow.

Cooling coils in non-agitated oil baths are generally avoided, because buildup of sludge on the coils soon prevents efficient heat transfer. With proper agitation,

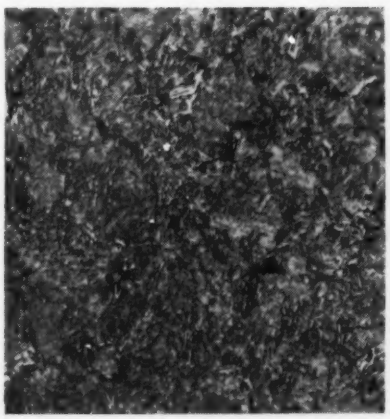


FIG 10
Agitated oil quench

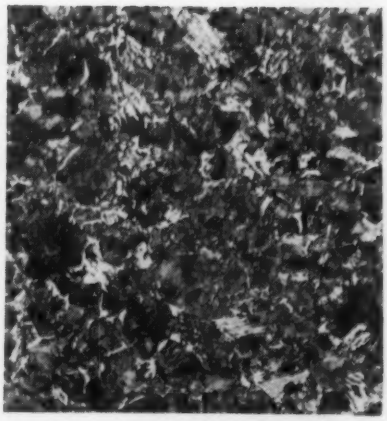


FIG 11
Still-oil quench

The Steel with "Built-in Productivity"

If your problem is to produce quality work at highly competitive prices—

If steadily rising operating costs make your problem almost impossible—

TRY LEDLOY*

the Steel with "Built-in Productivity"

Copperweld Aristoloy Leaded Steel gives freer machining, faster feeds and speeds and longer tool life.

The use of Ledloy often eliminates final machining because it cuts clean for finer finish.

For proof of increased production at lower cost, try a partial run with Aristoloy Leaded Steel.

*Inland Ledloy License

ARISTOLOY STEELS

COPPERWELD STEEL COMPANY • Steel Division • WARREN, OHIO

PROPELLER-AGITATED QUENCHING...VI

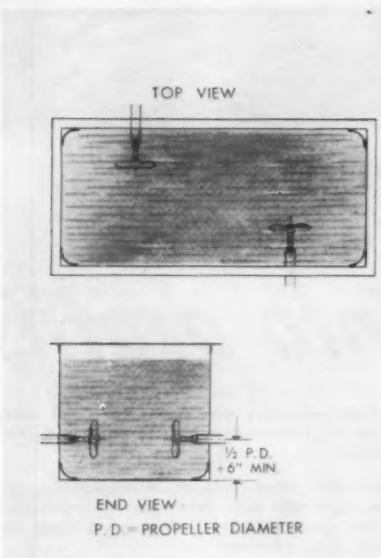


FIG 12

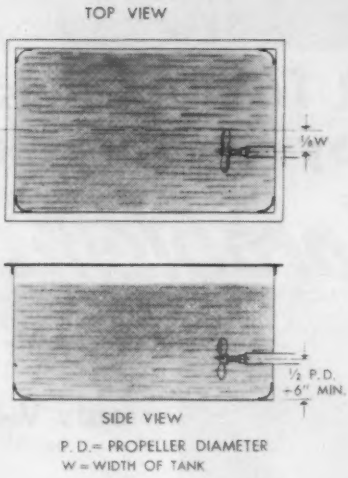


FIG 13

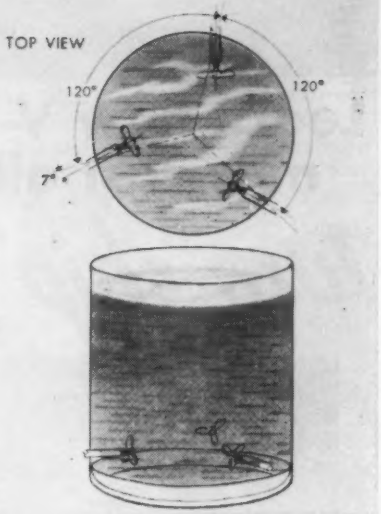


FIG 14

however, less oil is carbonized and, therefore, less sludge is formed; more scale is removed; and the cooling coils are continually wiped clean.

2. How Many Agitating Units Should be Used?

(a) Cylindrical tanks:

1. In small cylindrical tanks requiring a 3-hp agitator, or smaller, one unit, usually top entering, is applied. In cylindrical tanks requiring over 3 to 6 hp, two units are generally used and these are either side or top entering.

2. Where 10 hp and more are required for cylindrical tanks, one or more side-entering units are used, depending on the work being quenched or the room available for installing the units.

(b) Rectangular tanks:

1. When tank length is up to twice the width, either one large unit or two small ones may be used, depending on tank volume. In tanks over 4000-gal capacity, the size of commercially available units will determine the number and size of the units to furnish the desired horsepower. See Figs 12 and 13.

2. When tank length is three to four times the width, four units should be used. In large tanks, the number of units also depends on the sizes commercially available.

3. When tank length is greater than four times the width, the units should be spaced alternately on opposite sides of the bath with lateral spacing between propellers on each side not greater than three times the propeller diameter.

(To be continued)

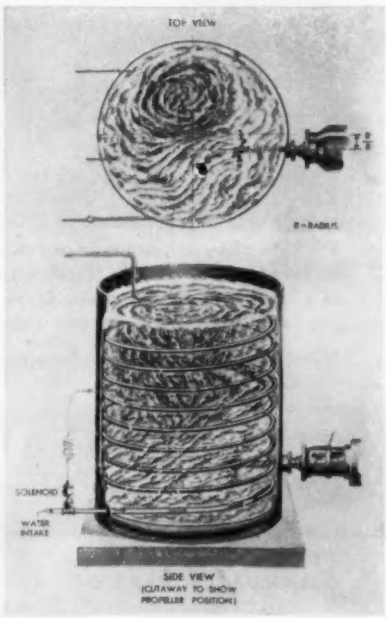
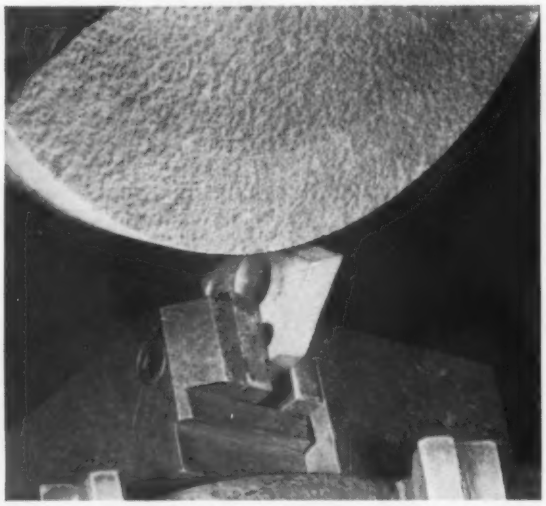


FIG 15

Learn how V-R Toolholders with the new cast alloy Chipbreaker...

Turn "chip" problems into profits



V-R cast alloy chipbreaker plates are available either as standards or blanks. Standards require no grinding to place them in operation. Blank chipbreaker plates can be easily ground on any wheel for any job.

only V-R chipbreaker plates are made from cast alloy, giving the combination of long wear and shock resistance.

only V-R chipbreaker plates made of special cast alloy produce segmented chips over wider cutting ranges, yet are easily modified for any job without diamond wheel grinding.

Typical savings of $180.00 a week in auto plant

Machining costs on automotive transmissions were reduced $180.00 a week in this Indiana auto transmission plant* by using V-R toolholders with new cast alloy chipbreaker plate. The combination of "Throw-Away" blanks and the chipbreaker plate eliminated carbide grinding at a cost of $1.00 each on 180 tools per week. (Average time to regrind a brazed tool was 15 minutes, including the ground-in chipbreaker.)

Survey figures show that over 90% of all manufacturers using carbide tools can save money by switching to the V-R toolholder with the New Cast Alloy Chipbreaker Plate. Write for details.

**Name on file*

Visit the V-R Display Booths 246 and 247, Product Engineering Show, Chicago, September 6-16.

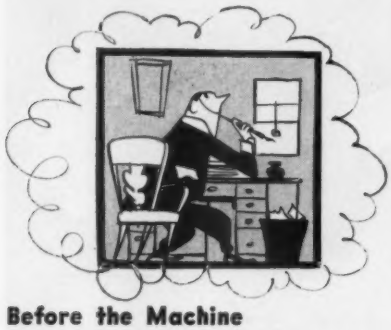
Vascoloy-Ramet CORPORATION

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

MANUFACTURERS OF CEMENTED CARBIDES • CARBIDE TOOLS AND BLANKS • TOOLHOLDERS AND INSERTS • TANTUNG TOOLS • DIES • MINING TOOLS • INVESTMENT CASTINGS

816 MARKET STREET WAUKEGAN, ILLINOIS

Talking Shop . . .



Before the Machine

JULES VERNE was one of the greatest travel and science-fiction authors who ever lived. Yet for forty years he scarcely stirred from a small room in a house at Amiens. There, in longhand, he turned out book after book, 77 in all. In imagination he had gone around the world in 80 days and and imagination also took him 20,000 leagues under the sea. Imagination to him was a precious creative gift. He held that what one man can imagine, other men can do. Before the machine comes the thought of the machine.

Once Over

YOU KNOW what the once over is?

That's this!
when like
you girl
look at a pretty

Atomic Ideas

BABCOCK & WILCOX, at its research center, Alliance, O, has drawn both titanium and zirconium down to wire 0.08 in. in diameter. Start was from a sintered, powder-metal bar about ¾ in. in diameter. . . . Other research indicates that ordinary carbon steel can replace many of the fancy alloys in atomic-energy plants, except in the reactor core. Savings may be as much as 80%.

Preventive

IT'S FUNNY to see the weekend shopper drop a bag of food. It's not nearly so funny when a crane, hoist, or lift truck does. The results are always costly, may be tragic. To avoid such problems, more and more companies are giving truck forks and hoist or crane hooks periodic tests by Magnaflux, X-ray, dye penetrant, or other available method, to search out incipient cracks.

Tragedy

AN ENGINEER found himself condemned to a long prison term despite the continuing need for technical men. Within his first few days in his cell, he was startled by a bite—and caught the offending flea. His first murdeous impulses were succeeded by an idea involving pure genius—he'd train the flea!

After five years, the flea was capable of any stunt any other flea had ever performed, and a few extra. Five years more, and the flea could do anything any circus animal can do—and the trapeze acts as well. Besides, he had learned to talk. . . Ten years more of arduous training, and the flea had developed an intellect, could carry on a conversation, and knew all the engineering his owner could remember.

The engineer now eagerly awaited release, because his fortune awaited him—sideshow and TV performances, a partner in engineering work. . . The moment he was freed he was ready to test his prodigy. Dashing across the street from the prison to the nearest cocktail lounge, he carefully placed the flea on the bar and summoned the bartender.

"Yes?" said the bartender.

"Look!" said the erstwhile prisoner, "See the flea!"

"I'm so very sorry, sir—it's the pet shop next door, you know," explained the barman—and squashed the flea.

Atomic Tool Analyzer

RADIOISOTOPES may help you test cutting tools and dies for wear some day, suggests R C Shuman, chief metallurgist, The Parker Pen Co. Cutting tools can be irradiated, then a sample cut taken, as reported by Cincinnati Milling several years ago. By comparing the amount of radiated material transferred from tool to chips or cutting fluid for several different setups and tool grinds, you can pick the best. Likewise a die can be plated with irradiated chrome, then a sample part struck. Radiation from the part not only gives you a rough idea of potential die wear, but might also tell you which areas may stick or have too much pressure.

Wives

ONE KEY to success is the wife, Edward R Finan, Research Institute of America, told a hardware dealers' meeting in Michigan recently. He feels the employe's wife may be the key to success or failure of a hardware store (and any other business —Editor).

One survey among 15,000 wives showed 86% want to know more about their husband's work, but only 2% got the information they wanted.

Mr Finan's suggestions for getting wives to work are:

Invite the wives to an occasional company business meeting and let them join in the discussion.

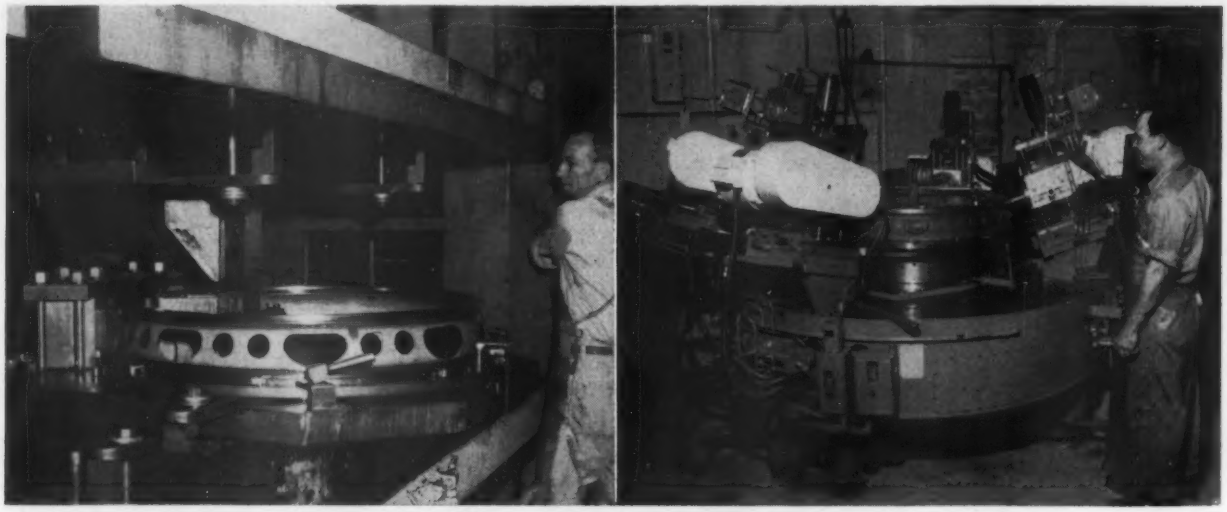
Send employes' wives flowers on their birthdays.

Treat the wife and family of an employe to dinner to celebrate completion of another year with the company. (And get ulcers!—Ed)

Try not to hold meetings after closing hours on short notice.

Mr Finan may not have heard of it, but a top psychologist said recently that harridan wives are the real key to success for men. If the wife is happy and complacent, the man goes nowhere. If she nags, is never satisfied, and keeps needling him, he may stay away from home every chance he gets, but he will fight for success to keep her quiet.

News of Metalworking . . .



Home-Grown Tooling for Jet Aircraft Parts

IN-PLANT TOOLING DEVELOPMENTS such as these are helping speed output of J-65 jet engine parts at Ryan Aeronautical, San Diego. At left is a side-acting press tool that pierces kidney-shaped and round holes in a compound-curved ring. Wedge blocks in ram move horizontal-sliding punches that work against horizontal dies shaped to fit the round surface of the work. Four-head boss miller (right) cuts an 8-hr job for a regular miller down to 56 min. Indexing table rotates rings as 71 faces on castings welded to rings are cut at four different angles

HERE'S THE '56 MILITARY BUDGET:

The Budget Is Bigger, But Spending Will Be About Equal

Congress has okayed a $9.2 billion hard goods appropriation for next year, topping the President's request, and nearly a third bigger than the 1955 military budget

WASHINGTON — Congress has put the finishing touches on the 1956 military budget, appropriating $9,234,200,000 for hard goods procurement — planes, tanks, production equipment, and the like.

The new appropriation tops the $8,670,000,000 figure requested by the administration, and the $6,476,300,000 appropriated for fiscal 1955. In addition to military procurement, Congress voted $86.4 million for Merchant Marine construction in private shipyards.

Despite the decided jump in the military budget, military hard goods spending will be just a little ahead of 1955's $12.6 billion—$12.7 billion.

Here is the spending breakdown by services:

• **Air Force** will spend $6.306 billion for aircraft and related procurement in 1956, contrasted with $2.760 million this year. Budget request for this item was $6.1 billion. On other major procurement, the Air Force has a $349.8 million 1956 appropriation, against 1955's $674.3 million—lower than the administration's $400-million request.

• **The Navy** has a fiscal 1956 appropriation of $905.6 million, against 1955's $1.9 billion, but more than the $753-million budget request. Shipbuilding and conversion will get the lion's share of the 1956 Navy money —$1.387 billion, slightly more than its request of $1.317 billion, and considerably ahead of 1955's $1.042 billion. While the Navy was given no money for ordnance and ammunition this year, and requested none for next year, Congress nevertheless voted $185.8 million for this purpose.

• **The Army** asked and got exactly nothing for major procurement and production in 1956—but it didn't get anything this year, either. In spite of this, the Army's spending for major production and procurement in 1956 will come to $1.693 billion, and it's spending $1.348 for the same purpose this year — although the budget figures don't show it. Reason is that the Army has tremendous unobligated balances and has been cutting back tank output and ammunition production since Korea.

• Interservice money—$100 million — has been approved for the Vance Plan (standby production equipment). For details on this, please turn to "Machine Tools," page 103.

FORD PLANT FOR SALE

RICHMOND, CALIF—Ford Motor Co's 60-acre plant here is up for sale. Built in 1930 at a cost of $3.5 million, the plant was vacated this spring, when its equipment was moved to Ford's new Milpitas, Calif, plant. Ford has a $1.5 million offer from a syndicate that wants to lease it to at least 25 tenants.

DEFENSE PLANT DISPERSAL:

Lockheed and Boeing Are First to Feel the Sting of the Government's "No New Defense Plants on Either Coast" Policy

WASHINGTON—The government's new plant dispersal policy is shaping up. It involves military procurement contracts and accelerated tax amortization for defense plant expansion.

Two companies that are apparently affected by the new policy are Lockheed and Boeing. Lockheed reportedly has been unable to get a guided missile production contract because its Burbank plant is in a target area. Presumably, the firm lacks idle facilities there for full production of a new weapon. Boeing now seeks a plant site in Oklahoma to produce the Bomarc missile. The Air Force ruled against Boeing expansion on the West Coast.

For the past four months, Defense Dept procurement plans have been to place at least 40% of production of certain individual weapons with contractors located outside critical target areas — i.e, heavily industrialized cities. But up to now, only guided missiles have figured significantly in this policy. It's reported that President Eisenhower has taken a personal interest in assuring dispersal of missile production.

All this dispersal talk has generated considerable anxiety over the future of the aircraft industry in Southern California. Congressmen and business leaders in the Los Angeles area have been needling the Pentagon to find out what the new policy will mean in new production for plants there.

The Air Force's answer goes like this: there is no plan to "disrupt existing production centers." Aircraft and guided missiles contracts will still go to the big plants in Los Angeles — and other coastal cities. But if a new weapon goes into full production and new facilities are needed, the new plant will be dispersed outside important target cities. At the same time, dispersal is mainly a matter for big prime contractors. Subcontractors will not be affected, according to Air Force spokesmen.

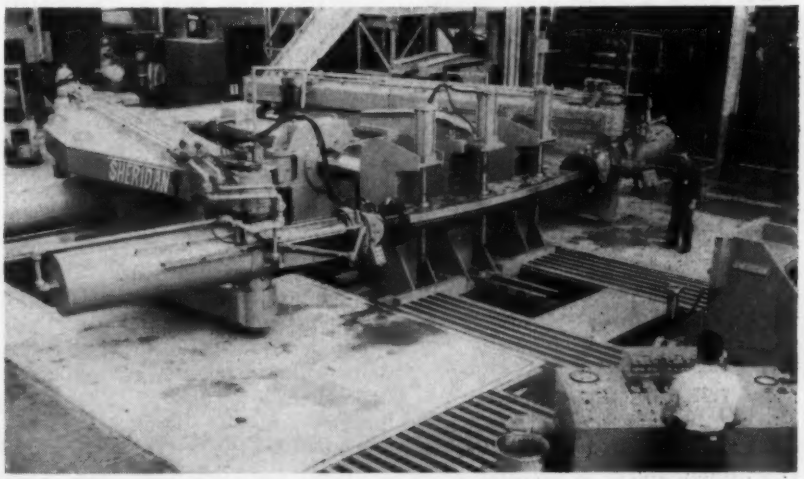
This is the situation on fast tax writeoffs: until recently, the dispersal standard was at least 10 miles outside a target zone. The yardstick was made obsolete, however, by full disclosure on thermonuclear fallout. So there's no longer a firm dispersal yardstick for tax writeoffs on new plants. Instead, each case is handled individually. Office of Defense Mobilization and Commerce Dept's Area Development Division — the two government agencies concerned — now evaluate such factors as terrain, prevailing wind currents, and other geographic considerations before granting tax assistance for new defense plants.

WEEKS FORECASTS ALL-TIME-HIGH OUTPUT FOR '55

WASHINGTON — Major industries will chalk up the highest production and sales records in history this year. That's a prediction made by Secretary of Commerce Sinclair Weeks, who bases his forecasts on a mid-year survey of 400 U S manufacturing industries made by the Business & Defense Services Administration.

Based on this survey, record highs are forecast for 1955 in: automobiles and trucks, pleasure boats, construction activity, oil field equipment, chemicals, rubber; pulp, paper and paperboard, lumber, communications, printing and publishing.

At or near record highs are production and sales of primary metals such as iron and steel, copper and aluminum. Summed up this means 1955 is the top year in U S industrial history.



Biggest Stretch Former?

180-TON SHERIDAN STRETCH FORMING PRESS, installed at Boeing Wichita, recently turned out its first finish-formed production part — a B-52 wing chord 14 ft long and 1¼ in. thick. Claimed to be the largest of its kind, the press has pincer jaws that grip the metal with 20,000 lb of pressure per linear inch. Die capacity ranges from 48 to 192 in., but parts up to 288 in. can be handled. Special sheet jaws can hold a part 72 in. wide. Die table, with 161 in. maximum forward movement, is a part of the press's main body, which is supported on a 95-ton frame set in an 8 ft deep pit. Female dies can be used on adjustable "bulldozer" to form reverse contours

☆ Field Report USA:

GREENSBORO, N C: Run fer the hills, Yank, us Rebels is on the way! (After a brief spell to toast Dixie belle Peggy O'Connell in a frosty julep or two). Those "colonels" with the gleam of battle in their eyes, suh, are the men who will invade the Machine Tool Show in Chicago with squaring shears and bending rolls from Dixie's sole exhibitor, Wysong & Miles Co of Greensboro

DETROIT: this 73-tooth automatic transmission internal helical gear, nearly 6-in. in dia and 1-in. wide, is ready for shaving after a single pass by National Broach & Machine's new Red Ring broach, world's largest

Chicago...

New Ford stamping plant . . .

CHICAGO HEIGHTS ILL—Ford Motor Co will build a 1.5-million-sq-ft stamping plant on a 140-acre site in Bloom Township near here. The plant will contain 16 major press lines and will employ about 2500 people. Construction of this stamping plant (Ford's fourth) will start as soon as the area is rezoned. Completion is slated for mid-1956.

East Coast...

Hoe goes all out . . .

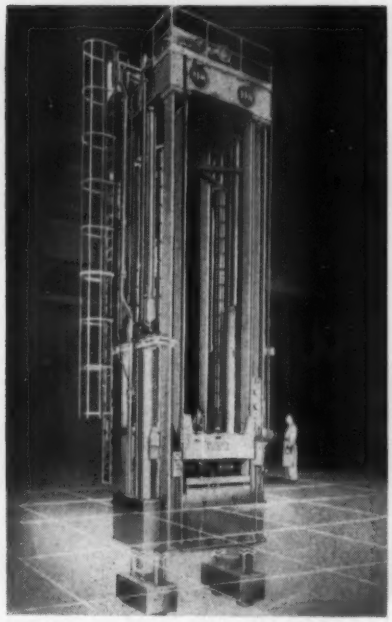
NEW YORK—R Hoe & Co Inc, oldest U S maker of printing press equipment and saws, plans to buy $1.2 million worth of machine tools as part of a $2-million expansion program, largest in its 150-year history. When the two-year tool program winds up, Hoe will have new machine tools in every department of its several plants—machine shops, and foundry and saw-manufacturing facilities—and Hoe will have the most modern plant in the printing equipment industry.

Factory earnings at record high . . .

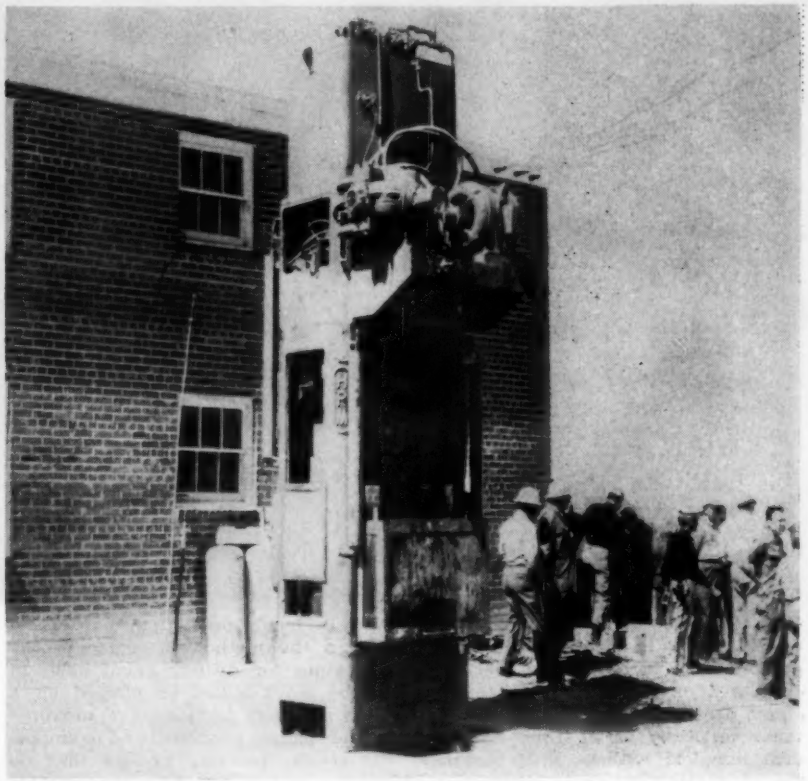
Hourly earnings for Middle Atlantic area factory workers broke all records for the second month in a row in May. New Jersey workers made the most per hour on the average—$1.93. New York averaged $1.89 (1¢ below February's peak), and Pennsylvania averaged $1.90. Average weekly earnings were at an all-time high in New Jersey ($78.62) and Pennsylvania ($75.54). New York's average weekly earnings were $74.13, 13¢ under the record highs of February and March.

Eastern briefs . . .

Westinghouse Air Brake International Co will supply the Republic of Turkey with $32-million worth of equipment "for top priority projects indispensable for the economic development of Turkey" . . . Pittsburgh's now-abuilding Parkway Terminal is expected to do for warehousing and light industry what those fancy shopping centers do for groceries, dress shops, etc—it offers 2-million-sq-ft of warehousing and manufacturing area, plus overnight freight service from its own sidings to eastern and midwestern market centers, and rapid truck access to major highways . . . Durable goods output in the New England area is definitely on the upswing, with machinery production doing particularly well . . . UAW-CIO Local 130 is trying to get a guaranteed annual wage agreement from Kaiser Metal Products Co, Bristol, Pa . . . United Engineering & Foundry Co is spending $600,000 on expansion of its Lobdell Division at Wilmington, Del . . . Another eastern industry has fallen into the fast-spreading net of Frederick W Richmond's industrial combine. Latest acquisition is National Valve & Mfg Co, Pittsburgh maker of industrial piping . . . Here's how New York City manufacturers see second half 1955 compared with the first half—84.9% "no change," 8.2% "increase," 1.4% "decrease," and 5.5% "no comment" . . . Union Carbide & Carbon Corp's Electro Metallurgical Co division is cutting its price-per-pound of ferrocolumbium $5.10, and ferrotantalum-columbium $1.60. Reason: completion of government stockpiling and withdrawal of a 100% production-stimulus bonus . . . C S Walker Co Inc of Worcester, Mass, is introducing a jig-fixture combination with magnetic characteristics, and a nonmagnetic rotary vacuum chuck for jet engine machining . . . ACF Industries' Berwick, Pa, plant has a $3.6-million Army contract to make 8-in. shells for the Philadelphia Ordnance District.

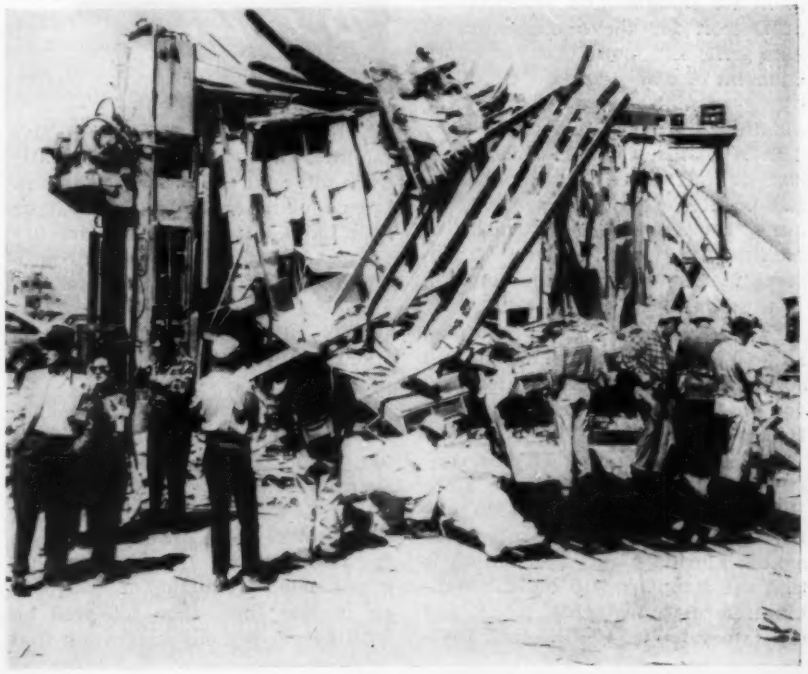


MT GILEAD, OHIO: world's biggest reinforced plastics press (weight 307,000 lb, capacity 600 tons) was built by Hydraulic Press Mfg Co for Zenith Aircraft of Gardena, Calif



A-bomb survivor . . .

SURVIVAL CITY, NEV: this hydraulic press, manufactured by Hydraulic Press Mfg Co, Mt Gilead, Ohio, was one of the few test objects in a recent A-bomb explosion here to come through undamaged. Set up 4700 ft from ground zero (photo above) in front of a two-story brick building, the press came through virtually without a mark (photo below), while the brick building became a complete shambles when hit by the full force of the blast. This was the oft-postponed atomic test that millions saw on television earlier this summer



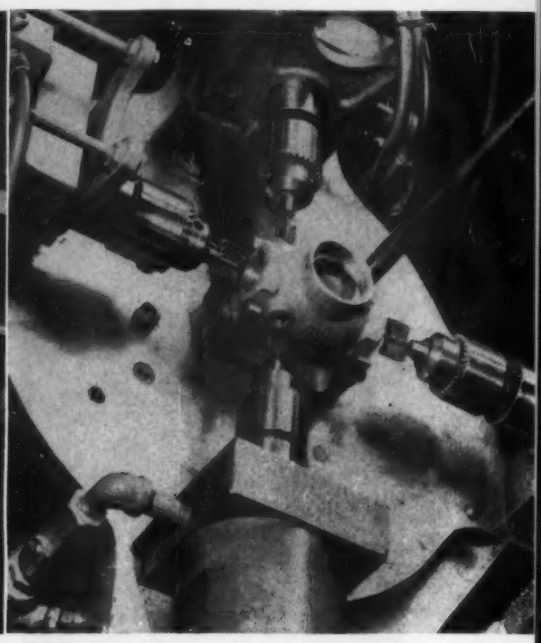
Southwest...

Dixie's Booming . . .

ATLANTA — Industrial expansion throughout the South continues its upswing without a pause. Reports from commerce departments of the southeastern states indicate that 1955 may be a record breaking year for new manufacturing plants in the area. Take Georgia, industrial development during the first six months of 1955 is at least 10% ahead of last year. Considering only new industries and expansions where the investment amounts to $50,000 or more, Georgia's industrial progress has been swelled by more than 65 increases or expansions since the first of the year. These plants provide upwards of $5 million in additional payrolls and 2300 new jobs for the state's workers, let alone new markets for capital equipment manufacturers.

Some of the programs in the works: a new Atlanta plant for Carolina Machine Tool Products Co for the manufacture of precision machinery . . . a $15-million expansion of the Southern Railway yards and shops in Atlanta . . . Re-opening of

Field Report USA:



BALTIMORE: Martin engineers, faced with a tough production bottleneck, turned up with an idea that costs less than the method it replaces. The problem was to relieve an overload on machines for drilling small holes in contoured sheet metal parts that couldn't be stack-drilled or pierced on a punch press. Martin took several surplus rivet squeezers from storage, mounted them vertically on a table, added anvils and pierce punches, and standard drill templets without drill bushings. The result: piercing presses that do the job faster than drills, elimination of burring operations, and a considerable saving in operational costs

CLEVELAND: new brushing method for deburring parts has proven to be 66% faster than individual deburring by hand at Osborn Mfg. Co. Part is placed in a jig, then the operator presses a button to actuate four air-operated drills, and four wire brushes the size of the ID of the hole remove the threads

Harris Foundry & Machine Co in Cordele, Ga, which last year turned out the largest scrap baling press in the world and this year has orders for scrap presses totalling more than $1 million . . . a new Carrollton, Ga, plant for Douglas and Momason Co of Detroit for the manufacture of auto grills and mouldings . . . establishment of a Waynesboro, Ga, plant by Perfection Industries for the manufacture of heaters.

In Alabama, Connors Steel Division of H K Porter Co announced a $2.5-million expansion program in June. The expansion will consist of facilities to produce cold drawn steel, the first such steel production in the South.

Also in Alabama, the newly formed Dixie Electrical Mfg Co has started construction of a $1-million electrical equipment manufacturing plant in the Birmingham area.

General Electric, which has constructed 17 Southern plants since WWII at a cost of roughly $260 million, may soon announce plans for a new Florida plant. Speculation is that the company will build a combination manufacturing plant and laboratory for its Weathertron Division somewhere in the St Petersburg area. Also in Florida, Alliance Machinery Co is negotiating for an aluminum extrusion plant in the Miami area.

Detroit...

Ford's expansion plans . . .

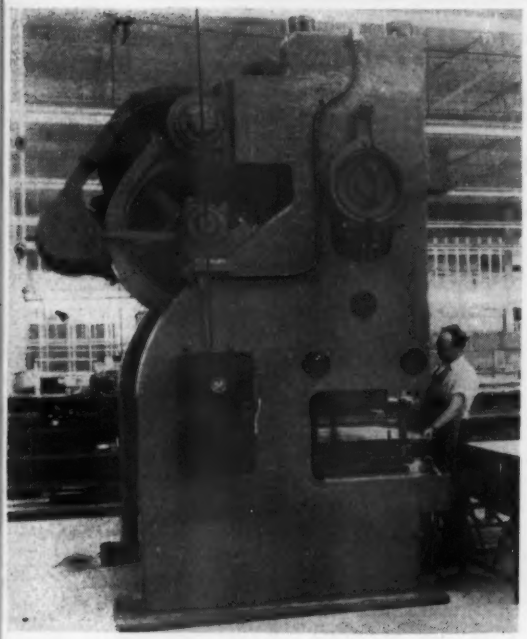
DETROIT — Mercury's productive facilities will be enlarged greatly over the next two years. That new engine plant Ford plans to put up near Lima, Ohio, will build Mercury engines only, and will get into production sometime in 1957. Mercury also will build a "huge" new assembly plant on a 200-acre tract about 4 miles from its present plant in Los Angeles.

Lincoln is in line for a new manufacturing plant and office building, too, to be built somewhere in the Detroit area. Lincoln, incidentally, recently pulled a merchandising stunt unlike those generally seen in the auto business. It announced that it had ended production of 1955 models in late June, then followed up with newspaper ads suggesting that dealers would soon be without stock, that now would be a good time to buy a '55 Lincoln, when dealers were cleaning out in preparation for the '56 models—"a great new Lincoln." Auto companies customarily stay silent about upcoming models, reasoning that any excessive bragging will cause buyers to defer purchases. Stock clean-ups should be no problem for Lincoln dealers. The new Lincoln will be introduced publicly on August 31, when dealers will have had more than two months to unload present stocks—which couldn't have been large in the first place. Lincoln built only 21,676 units in the first half.

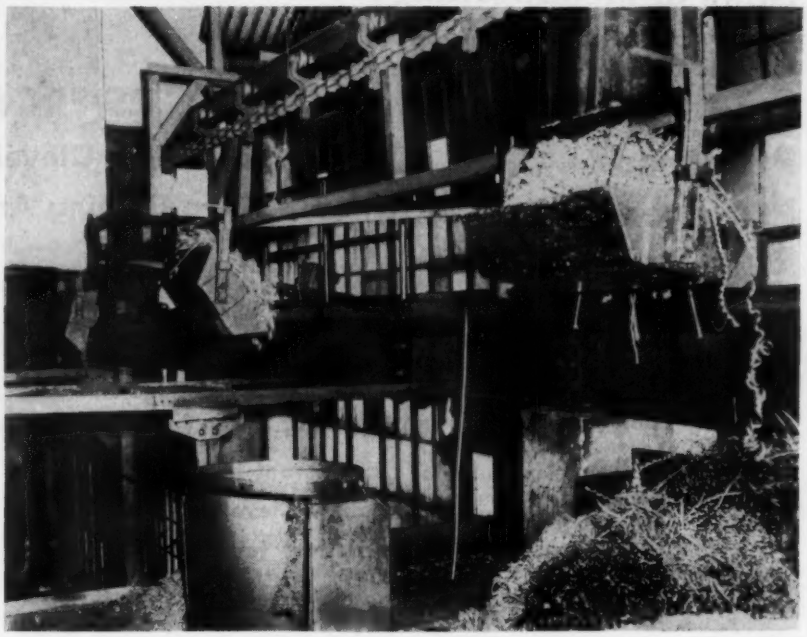
West Coast...

San Francisco—"Good"

SAN FRANCISCO — Metalworking companies in the Bay Area continue to put business this year at about 10-15% above last year's, and to deny struggling with any major problems. Materials are in easy supply (distributors quote a 10-15% increase in sales) and labor supply is "in bal-



COLUMBUS, OHIO: rubber mounts for practically all machines at Ebco's new $3-million plant here provide vibration absorption and layout flexibility. Shown is a rubber-mounted Bliss 44,000-lb blanking press. Ebco's new plant is windowless, has 55 footcandle illumination throughout, complete air conditioning



SYRACUSE: this continuous chip conveyor loads 35 tons of chips a day into gondola cars at the New Process Gear Co. The conveyor, built by Lamson Corp, also of Syracuse, is manually loaded at central chip bins in the basement, travels up and out over a railroad siding, and dumps the chips automatically into a waiting gondola car. Each of the flat-bottomed pans, shown mounted at 10-ft intervals on the conveyor, carries 40-lb of chips

ance"—no surpluses, but no acute shortages either, in skilled or production workers.

Only weakness that showed up in *AM* spot checks was in manufacture of electrical utility equipment. Power companies overbought during the Korea scare and, because of the long delivery period on this item, the slack-off in orders started to rub only about the end of last year—resulting in some price warring. However, the power company backlog is lessening and this problem has eased. Even though business is off, such companies have kept their labor force about constant, simply shortening time for delivery.

War and peace . . .

SEATTLE — Military production typified by the warplanes being turned out by the Boeing Airplane Co continues to dominate the metalworking industry in the Pacific Northwest. But production for peacetime industry is gaining in importance. Even Boeing has its eye on a possible peaceful future. Last week it played host to officials of United Airlines, who later announced their intention of placing an order this year for 20 jet airlines costing approximately $100 million. Boeing is the most logical supplier, said the airline officials.

Boeing's neighbor, Kenworth Motor Truck Corp, has converted almost completely to civilian production—so successfully that its employment has reached a peacetime peak of 1100. Its biggest single order, involving 200 trucks for Yellow Transit Co, Kansas City, Mo, will keep employment at its present high level at least through October.

Other firms which describe themselves as "never busier" are Washington Iron Works, Pacific Car & Foundry Co, and Puget Sound Sheet Metal Works. Stetson Ross Machine Co, producing equipment for lumber mills, reports that its orders have been on the uptrend for three or four months and now requires 3-5 months for delivery as compared to 1-3 months earlier in the year.

West Coast briefs . . .

May employment in San Francisco-Oakland manufacturing was up 700 from last May, hitting the highest level since October 1954 . . . Columbia-Geneva Steel Division, U S Steel, has received a $366,342 Army Ordnance contract for layaway of the government-owned Pittsburgh Ordnance Steel Foundry and its machinery. The facility, formerly called the Columbia Steel Foundry, was restored at cost of $6.5 million for government manufacture of armor steel hull castings during Korea. To keep it in readiness, Columbia-Geneva will clean, repair, package, preserve and dehumidify machinery and equipment, and provide maintenance and inspection services . . . Maritime Steel Fabricators, newly organized shipbuilding firm, has leased facilities from the Port of Oakland. The company constructs barges, dredges, small craft . . . Kuhl Mfg Co, sheet metal firm, is moving from Oakland to a newly completed $100,000 plant in San Leandro . . . Auto workers in California won't be able to take advantage of GAW unless the state unemployment insurance code is changed. Under California law, benefits (over $3 weekly) paid by a company to an unemployed worker would be deducted from the amount he would get from the state.

Contractors Cold-Shoulder Proposed Procurement Rule Revamp

WASHINGTON — A Pentagon proposal to revise Armed Services procurement regulations is under fire from most big defense contractors. Most important provision in the proposed revision: disallowance of executive incentive plans such as profit-sharing and stock-bonus programs as costs in the cost-plus-fixed fee contracts for companies doing over 25% of their total business with the military.

Major trade associations in defense industries object to this and other proposed revisions on cost allowability. Machinery and Allied Products Institute, for instance, complained that military contract cost principles "do not in fact agree with general commercial accounting practice in many respects."

Costs of executive incentive plans have not figured much in procurement regulations up to now. The question of cost-allowability for these programs has been mostly a matter of individual negotiation — some services have allowed it for certain companies, some have not.

The plan to put specific rules into print — setting uniform provisions for all the services — is actually part of an overall revamping of the procurement regulations that's been in the mill for over three months. Some weeks back, the Defense Dept sent drafts of the revised regulations for comment from representative defense industry groups. The comments have now been submitted, and later next month, industry people will sit down at the Pentagon to hammer out the final revisions.

Other proposed changes

Other major changes in the proposed revision: (1) allowance of basic research expenses as a cost to be charged the government for companies doing less than 25% of their business with the military; (2) disallowance of selling and distribution costs; (3) limitation on advertising costs to material placed in technical journals, not general advertising media.

TOOLMAKERS FROM CANADA:

That's How Cleveland's Top Manufacturers Are Getting Around a Critical Shortage

Firms like Ford are hard put to get their quota of such skilled craftsmen as tool and diemakers, die sinkers and machinists. They don't want to pirate from their fellow Clevelanders. The solution: tempting offers to Canadian craftsmen

CLEVELAND — Tremendous influx of industry into the Cleveland area, plus expansion of old-time Cleveland metalworking industries, has created a crucial and almost inevitable shortage of skilled metalworking craftsmen here. Cleveland papers carry ad after ad for tool and diemakers, die sinkers, machine repairmen and patternmakers — but there just aren't enough skilled men to go around. And such top metalworking firms as Ford lean over backwards to avoid pirating from their townsmen.

Inevitably, Cleveland industry must look elsewhere for skilled labor. And the logical place to look is across Lake Erie to Canada, where skilled craftsmen's wages are comparatively low and U S salaries make tempting bait.

Across-the-border hiring has been going on for some time, but it received added impetus and publicity recently when Ford, which has been expanding its manufacturing and assembly operations at a phenomenal rate in the Cleveland area, filed papers with immigration authorities for admission of 300 diemakers and 100 toolmakers. Those numbers, a Ford source says, "are picked out of a hat and could just as easily be 2500 or 250," meaning that Ford alone will take an almost unlimited number of skilled men.

Ford, because of its rapid growth in the area, is probably in the most dire need of craftsmen, but there are many other area firms that need them badly, too — like Alcoa's Forging Division, which has just opened a tremendous shop to provide dies for two Air Force Heavy Presses at Alcoa Cleveland.

These firms have all tried getting skilled help through regular channels: first they consult the local State Employment Bureau office. Then when that office can't produce the needed men, an SOS is sent out to all Bureau offices. If that fails, the Bureau checks the unions for more manpower. If the needed men can't be turned up anywhere, the Bureau gives the okay to consult the Immigration Service.

Once a blanket quota is granted to a firm, the company advertises in Canadian newspapers, promising only immigration aid and a job — no transportation money or extras. Applicants are screened on the spot in Canada.

And while they're not advertising for them across the border yet, Cleveland firms are facing an equally critical shortage of semi-skilled and unskilled help, such as machine operators. The local unskilled labor pool is of course much greater than the skilled workforce, but it must be remembered that 10 unskilled workers are needed for every craftsman.

What's to blame for Cleveland's acute shortage of skilled workers in the metalworking industry? All the shops have apprentice training, but some say it's the union's 8000-hr course required before a journeyman's card is issued that's holding things up. This may be a contributing factor, but it's only partially responsible for the shortage. The real reason is the skyrocketing influx and expansion of metalworking in the Cleveland area.

NSPMA TO MEET

CLEVELAND—National Screw Machine Products Association will hold its national sales conference here August 9-10 at the Wade Park Manor. Featured luncheon speaker will be Henry D Sharpe Jr, president of Brown & Sharpe Mfg Co, who will discuss "Builder-User Teamwork as a Tool for Progress."

Companies in the News . . .

Michigan-Standard Alloy Casting Co is the new name of Consolidated Foundries & Mfg Corp's **Michigan Steel Casting Co Division.**

Rockwell Mfg Co, Pittsburgh, is building a $1-million, 104,000-sq-ft plant at Russellville, Ky, to turn out parts for all Rockwell products, including power tools and meters.

Electric Controller & Mfg Co has just completed a $4.5-million, 340,000-sq-ft plant at 4500 Lee Rd, outside of Cleveland, where it will produce a line of products from huge industrial magnets down to resistors and switches.

Hooker Electrochemical Co and **Niagara Alkali Co,** both of Niagara Falls, are talking merger.

American Can Co will start construction of a 185,000-sq-ft can plant at Arlington, Texas, in August.

Onsrud Machine Works Inc has transferred its **Metalworking Machine Division** from Chicago to a new plant in Niles, Ill. Onsrud's **Woodworking Machinery** and **Turbine Tool divisions** will remain in Chicago.

Wyman-Gordon Co, Worcester, Mass, has purchased a "substantial interest" in the **Prex Corp,** Chicago makers of small light alloy forgings, and Prex's subsidiary, **Midland Die & Engraving Co.** All Prex facilities will be moved to a new plant to be built at Franklin Park, Ill, west of Chicago.

National Cash Register Co has started construction of a 52,000-sq-ft research and development plant at Hawthorne, Calif.

Sutton Engineering Co is moving its executive and sales offices from Bellefonte, Pa, to the First National Bank Bldg, Pittsburgh.

Bendix Aviation Corp will spend $2 million on construction of a research and development center for radar and other navigational devices at Towson, Md, a suburb of Baltimore.

Reichert Float & Mfg Co, Toledo, has purchased **Swartzbaugh Mfg Co's** Toledo plant, will use it to enlarge its output of stampings, heat treating and silver plating.

Colonial Broach & Machine Co became the new name of **Colonial Broach Co,** Detroit, as of July 1, because "production of broaching machinery has become a larger factor in our operations in recent years."

Mueller Brass Co, Port Huron, Mich, is building a $300,000 aluminum window manufacturing plant at Srathoy, Ont.

Thompson Products Inc, Cleveland auto and aircraft parts maker, has acquired **Karl-Douglas Associates Inc,** Cleveland makers of hydraulic and pneumatic cylinders and valves.

Foster Wheeler Corp's new Mountaintop, Pa, plant, built in 1953, is already undergoing a $250,000 shop expansion.

United Engineering & Foundry Co will build an 80 x 100 ft addition to the foundry facilities at its Canton, Ohio, plant.

Hotpoint Co's new home laundry plant at 5660 W Taylor St, Chicago, literally a complete rebuild of an existing plant, opened formally last month, marking completion of Hotpoint's 10-year expansion program.

Trane Co, LaCrosse, Wis, has completed a 55,000-sq-ft coil manufacturing plant there.

Peabody Industrial Co, maker of portable hardness testers, has been purchased by **Mechanical Devices Inc,** Detroit, which will enlarge the Peabody line, simplify and improve it.

Snap-On Tools Corp, Kenosha, Wis, will add 45,000 sq ft of floor space to its Mt Carmel, Ill, plant.

Zippo Mfg Co's Chrome Plating Division at Bradford, Pa, is advertising that it has open capacity for nickel-chrome plating.

Lamson & Sessions Inc is buying **Kent Machine Co** of Cuyahoga Falls, Ohio. Kent, a builder of specialized machinery and cement-block building machinery, will retain its present personnel.

Marmon-Herrington Co, Inc, Indianapolis, has purchased the common stock of the **Cardox Corp,** Chicago manufacturer of mining, fire-fighting and agricultural equipment.

Whitnon Mfg Co, makers of precision high-production spindles for metalworking and other industries, has moved from New Britain, Conn, into a new, ultra-modern plant at Farmington, Conn.

Southern Pacific Co plans to spend $8.25 million for 950 boxcars.

ACF Industries Inc plans to buy the **Key Co,** East St Louis, Ill, makers of oil refinery, chemical and power plant equipment.

Stewart-Warner Corp, Chicago, has purchased the **John W Hobbs Corp,** Springfield, Ill, makers of electric meters and other devices for the automotive and related industries, as a diversification move.

George P Dickey Inc has been formed to make precision gaskets and steel rule dies.

General Dynamics Corp and **Stromberg-Carlson Co** stockholders have approved plans of those two firms to merge.

Van Norman Co, Springfield, Mass, has purchased **Super Tool Co,** Detroit and Elk Rapids, Mich, makers of carbide cutting tools, will reincorporate it as a wholly owned subsidiary and integrate its operation with another Van Norman subsidiary, **Morse Twist Drill & Machine Co,** New Bedford, Mass — the idea being that Morse will market a complete line of carbide tools under the Morse name. All 250 employees of Super Tool, headed by Gordon J Birgbauer as president, will be retained.

Liquid Air Systems has been organized at 10004 Ashland Ave, Evanston, Ill, by H J Goodyear, formerly chief engineer of Hills-McCanna Corp's ACRC Division, to provide consulting and engineering services for uses of liquid air in several metalworking applications.

Kenneth P Martin, general sales manager of the National Automatic Tool Co, has been appointed vice president, sales, succeeding the late **E D Frank**

Charles W Stewart, Jr, has been elected president of the Machinery and Allied Products Institute to succeed **William J Kelly,** who died recently. Mr Stewart has been executive vice president of MAPI for the past few months and, prior to that, was secretary

H J A Chambers, president of Standard-Machine & Tool Co, Windsor, Ont, has been named president of Standard-Modern Tool Co, Toronto. The new company is the result of a merger of five Canadian machinery firms acquired during the past few years by Stavely Iron & Coal Co of Great Britain. (For other companies, see below)

Names in the News . . .

Norton Co's Behr-Manning Division promotes: **Thomas Trowbridge,** sales manager of the company's eastern region, to assistant general sales manager; **William J Bennett,** industrial trades manager, to succeed Mr Trowbridge; and **Victor F Perreault,** industrial sales manager for the Buffalo and Pittsburgh divisions, to take over Mr Bennett's post.

John J Brogan, formerly general sales manager for Jefferson Electric Co, has joined Cleveland Pneumatic Tool Co as general sales manager.

E S Russey, president and general manager of the Warner Gear Division of Borg-Warner in Muncie, Ind, has been elected a vice president of the corporation. **A W Rose,** B-W Pacific Coast representative, has also been named a vice president.

J W Blackshaw, well-known to the American machine tool building industry, has retired from the British Ministry of Supply after long service with the British government and has been appointed to the board of directors of B Elliott & Co, Ltd, London. He was senior permanent civil servant in the British Machine Tool Control during World War II and continued to have responsibility for machine tool affairs after the war as assistant secretary, Engineering Industries Division, Ministry of Supply. He was in charge of all foreign purchases under the defense program during the Korean period.

Allis-Chalmers Manufacturing Co, in a realignment of its operating divisions, has set up an Industries Group (formerly the General Machinery Div), headed by **J L Singleton,** and a Tractor Group (formerly Tractor Div), under **W G Scholl.** Both men are company directors, and have been serving as vice presidents in charge of their respective operating divisions. Appointed to head Industries Group divisions: **J W McMullen,** vice president, transformer and switchgear equipment, to vice president and general manager, Power Equipment Div; **P F Bauer,** manager, apparatus department, and general manager of the Norwood, Ohio, Works, to general manager, Industrial Equipment Div; **William M Wallace,** manager of the processing machinery department, to manager, General Products Div. Named to head Tractor Group divisions: **L W Davis,** Pacific Coast territory manager, tractor division, to general manager, Farm Equipment Div; **Boyd S Oberlink,** vice president, tractor division, to vice president and general manager, Construction Machinery Div; **R K Mangan** will continue as president and general manager, Buda Div.

Warner Electric Brake & Clutch Co, Beloit, Wis, appointments: **Norman K Anderson,** general sales manager, to vice president, sales; and **King DeSeve,** manager of manufacturing, to vice president, operations.

Stavely Iron & Coal Co, British firm, has consolidated five Canadian machinery companies acquired during the last several years into a single unit under the name of Standard-Modern Tool Co, with headquarters at Toronto. Companies merged include: Modern Tool Works, Toronto; Standard Machine & Tool Co, Windsor, Ont; A R Williams Machinery Co, Toronto; A R Williams Machinery Western Ltd, Vancouver; and Pacific Tractor & Equipment Ltd, Vancouver.

Henry L Pohndorf, general sales manager of National Welding Equipment Co, San Francisco, has been elected vice president, sales. **William G Norman** has been appointed chief engineer.

Frank Breckenridge, formerly president and general manager of Automatic Washer Co of Newton, Iowa, has been named vice president in charge of engineering and manufacturing operations for Globe Hoist Co's three plants at Philadelphia, Des Moines, and Long Beach, Calif.

Harry L Smith, Jr, staff manager of product sales for Aluminum Co of America, has been elected a sales vice president of the company.

Harry A Burdorf, vice president of the Lunkenheimer Co, Cincinnati valve manufacturer, has retired after 50 years of service with the company.

HYDRAULIC PRESS MANUFACTURING CO NAMES .. **William H Bennett** (left), formerly sales manager of Lake Erie Engineering Corp, to vice president, sales; **J W Arnold,** formerly general manager, Erie Engine & Manufacturing Co, to vice president, manufacturing; **Robert J Lindsey,** formerly chief engineer, Elmes Engineering Division of American Steel Foundries, to director of engineering; **Glen R Pittman** (below), formerly assistant to the president, Cemco Industries, Inc, to sales manager, hydraulic power division; and **William N Woodward** to secretary-treasurer. All of the appointees, with the exception of Mr Arnold, are former HPM executives

Harold H Hippler, assistant director of sales and service administration for Gar Wood Industries, Wayne, Mich, has been appointed general sales manager.

George F Powell, Pittsburgh district sales manager of Rockwell Manufacturing Co's Delta Power Tool Division, has been named manager of Delta's newly enlarged government sales department. **K G Smithyman,** staff assistant in the inventory control and warehouse departments, succeeds Mr Powell.

J James Mudd, midwest regional manager of The Bellows Co, Akron, Ohio, manufacturer of pneumatic devices, has been named assistant manager of field engineers and sales.

John K Light, New England district sales manager for Arcos Corp, Philadelphia manufacturer of welding rods and electrodes, has been appointed to the newly created post of assistant sales manager of the company. **James A Brickett, Jr,** salesman in the area, succeeds Mr Light.

American Society for Testing Materials names new officers for 1955-56: President, **Claire H Fellows,** director of Detroit Edison Co's Engineering Laboratory & Research Dept; Vice President, **R T Kropf,** vice president and director of research, Belding Heminway Co, New York.

G Allen Lovell, assistant general manager of US Rubber Co's mechanical goods division, has been elected a vice president of the company, and divisional general manager.

M C Hutto has been appointed general manager of the Maxwell Co, Bedford, Ohio, manufacturer of precision tools. **Elmer J Kalat** has been named chief engineer.

Clinton T Cooper has joined Signal-U Manufacturing Co, Canfield, Ohio, manufacturer of industrial finishing, painting, coating, and special packaging equipment. He will serve as executive vice president.

John W DeLind, Jr, has resigned as chairman of the board of Borg-Warner International Corp. Mr DeLind was president of the corporation from 1946 to 1954.

Harold C Cook, purchasing supervisor of raw materials for Chrysler Corp's Central Purchasing Dept, has been appointed purchasing agent of the Dodge Division. He succeeds **John C Poyner,** named assistant general purchasing agent for the corporation.

C R Mitchell, Jr, product manager for stainless strip, Allegheny Ludlum Steel Corp, has been appointed manager of stainless steel sheet sales. He replaces **T B Brown,** who has resigned.

Howard J Findley, manager of research at Eaton Manufacturing Co's Central Research Div, South Euclid, Ohio, has been appointed assistant director of engineering for the company.

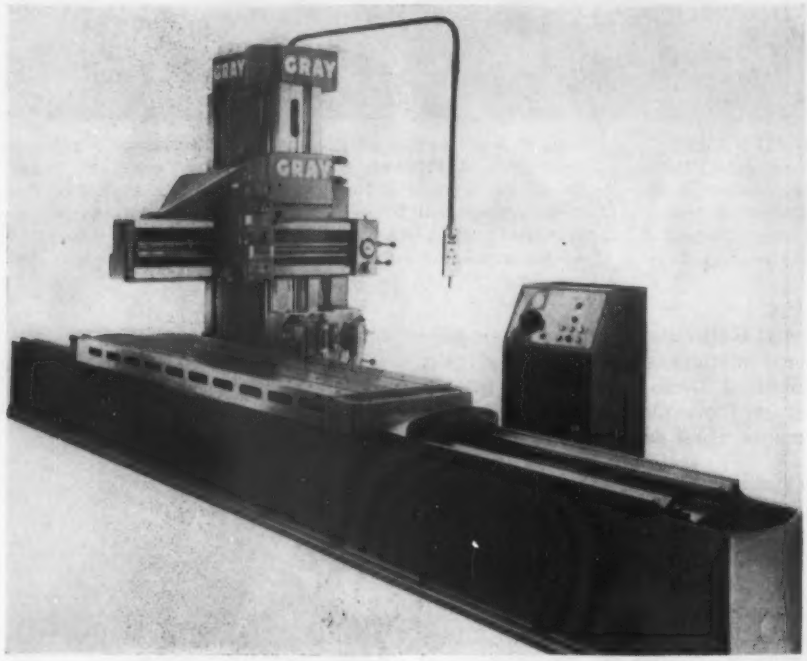
Glenn F Ihrig, assistant sales manager of Wellman Bronze & Aluminum Co, Cleveland, has been promoted to general sales manager.

Carl McFarlin, Sr, has been elected an executive vice president of Merritt-Chapman & Scott Corp, in charge of the company's Chemical, Paint & Metallurgical Division. Mr McFarlin is president of Tennessee Products & Chemical Corp, Nashville, which became a member of the M-C&S Div following its recent acquisition. He will continue to make his headquarters at the Nashville offices of Tennessee Products.

Keith G Splude, formerly application engineer at Louis Allis Co, has been appointed divisional sales manager of Stearns Magnetic, Inc's Brake Division, Milwaukee.

John F Whitcomb, eastern regional sales manager of Minnesota Mining & Manfacturing Co's Coated Abrasives & Related Products Division, has been appointed general sales manager. **Richard L Sheppard,** sales manager of stationery trades, has been named general sales manager of the Cellophane Tape Division.

New Shop Equipment



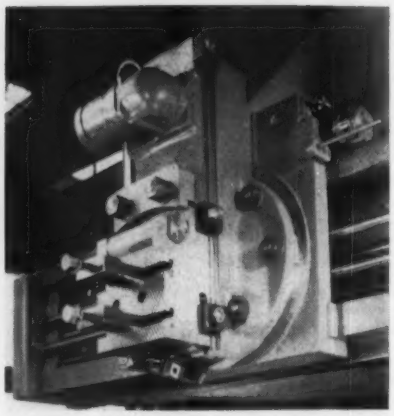
Gray Universal Planer Cuts Both Ways

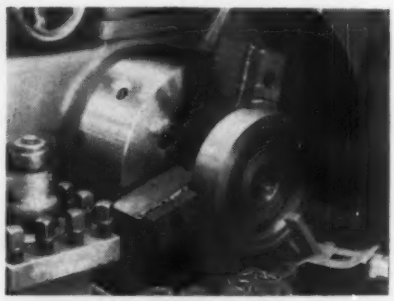
Double- and even triple-cuts are possible with this planer, because heads are designed for 2-way cutting if desired. There is a socket in each head (see sidehead in general view, and closeup of head) into which a holder is placed carrying two opposed standard carbide tips. The holder oscillates about a vertical axis a few degrees left or right, as required, to create side rake at stroke end. It comes against a positive 10-spline stop for rigidity. Meanwhile the head swivels a few degrees off the vertical rotating the lead tip down to provide cutting rake and clearance. This rotates the other tip up and away from the work. Both side and rail heads have this feature, change position automatically and instantaneously at reverse. The tool is thus closer to the rail and more rigid than in previous designs.

For triple cuts, a 2-way tool does roughing as above, while a third tool, conventionally held in forged-steel clamps which slide in the double T-slots of the clapper box and trailing the twin tool a bit, takes a rough-finishing cut. Such a procedure is suitable for planing motor pedestals on castings or blanking out shear blades, for example. Quick change to or from such planing is done by moving one lever and one button. An added feature is the ability to do light cross planing—keyways or corner chamfers, for example—by using the power crossfeed on the rail. Automatic reversal of this feedscrew by adjustable end stop dogs makes this possible. The feedscrew nut, incidentally, is of Formica, like the table ways.

The planer itself is a 35-in. by 10-ft universal with 25/50-hp variable-voltage drive and usual Gray features, such as loop lubrication, safety stop and table replacer, square-lock rail and column, angle drive, and simple feed. Maximum planing width is 38 in., height 37 in. The table is 32 in. wide by 122 in. long (working surface). There are 64 feed increments, 0 to 1 in., and a new high table speed range of 30 to 400 fpm. It can be used as a conventional planer, with more rigidity and higher productivity than earlier models. The double-cutting feature commands a slight premium. Total weight is 38,000 lb.

The G A Gray Co, 3611 Woodburn Ave, Cincinnati 7, Ohio





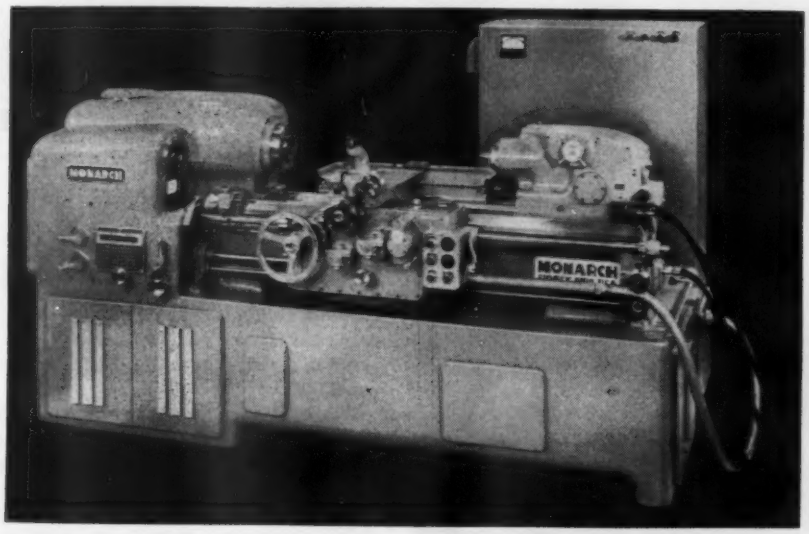
Ajust-Tru Air Chucks In 6- and 8-in. Sizes

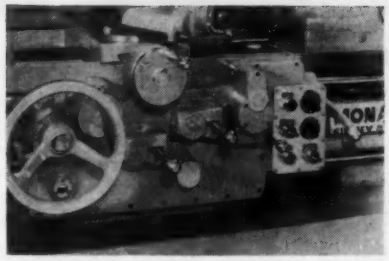
Two new sizes in air chucks, 6-in. and 8-in., for smaller lathes, automatics, and screw machines, incorporate the Ajust-Tru feature, plus hardened keyways. Units can be obtained with either two or three jaws.

Manufacturer states that with the Ajust-Tru element, jaws can now be turned in the toolroom, eliminating lost production time. Final precision adjustment is made on the machine. Chuck is guaranteed to hold within 0.001 tolerance with the jaws gripping the work under full air pressure. Jaw-turning fixture is also available.

Buck Tool Co, 2015 Schippers Lane, Kalamazoo, Mich

Materials and Parts . . .





CONTROLS ON APRON include (center) two polished knobs that operate rapid traverses for carriage and slide, and electrical box (right) with spindle speed range, spindle speed, constant-speed cutting, start, reverse, and stop

Constant Surface Speeds on Monarch 1000 Provided Through Electronic Controls

Series EE, Model 1000 precision engine lathe has a 20-hp DC motor delivering any speed from 25 to 2000 rpm in three geared ranges and one multiple-V-belt (high) range. Tailstock spindle is hydraulic-powered.

The electronic cabinet, to be mounted behind or beside the lathe, holds motor and load-compensation controls that keep spindle speed constant within 5% regardless of load. Full motor power is used as low as 107 rpm, for turning heavy work slowly. Speed ranges, changed with hydraulic power, and speed control are handled with knobs on the apron.

Friction levers control powered slow and rapid motions of carriage and cross-slide. Rapid traverse is obtained from an individual motor with safety clutch that releases in case of a jam.

Tailstock has hydraulic clamping and unclamping, and fast and slow traversing; also has a slight lifting action from spring-loaded rollers.

Gears are mist-lubricated, slides are equipped with wipers.

There are 66 feeds and threads, engaged at the gearbox on the left, ranging from 2 to 120 tpi and 0.001 to 0.066 ipr. Bed has a triangular-bridge construction with hardened ways. Lathe also has a spindle load meter, ball-bearing taper attachment, length dial, dial-indicator carriage stop, and apron-controlled leadscrew reverse, among other features.

Monarch Machine Tool Co, Sidney, O

. . . including

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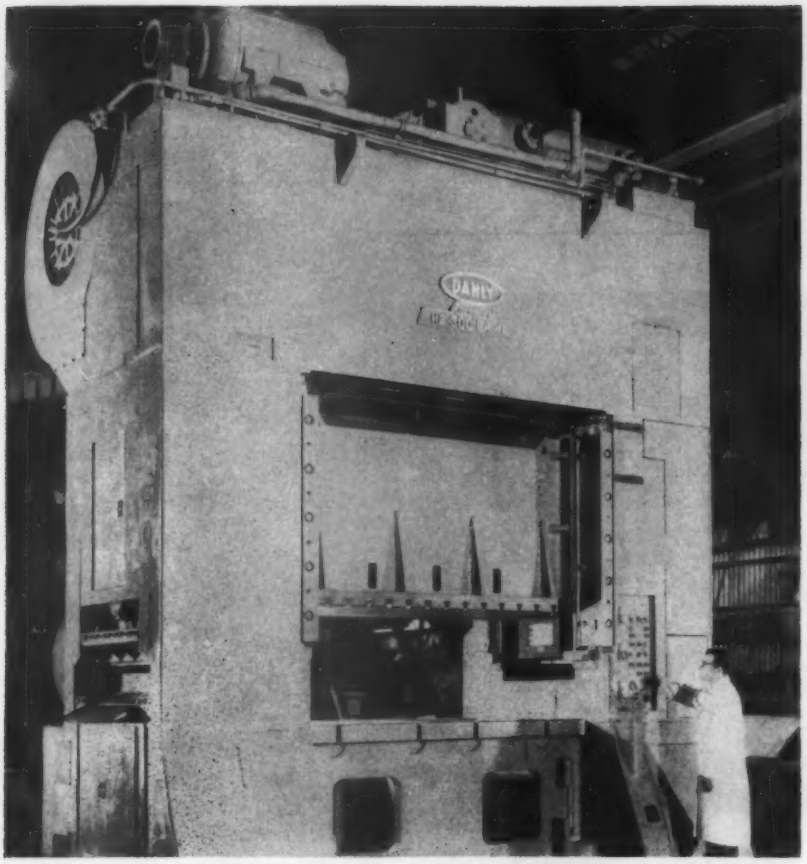


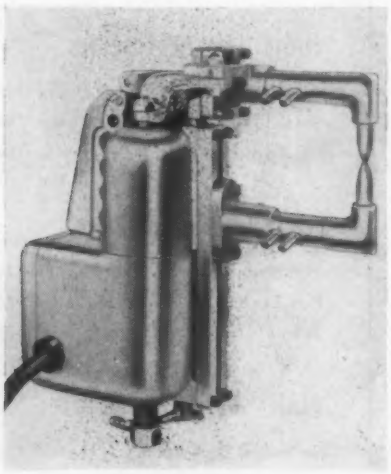
300-ton Danly Autofeed Press Has Totally Enclosed Accessories

All controls, the automatic feed device, and the scrap cutter are designed as an integral part of a new Danly Autofeed press. This feature makes the machine a complete production unit, ready for immediate operation as soon as it is set into position. No additional control panels or auxiliary equipment installations are required.

Control panels are conveniently located in the press uprights, and are protected against damage. Built-in automatic feed device and scrap cutter simplify material handling and keep floor area around the press clear. Hinged doors and panels provide quick access to all accessories.

Unit includes such standard Danly features as automatic oil lubrication and automatic oil pressure safety switches.

Danly Machine Specialties, Inc, 4358 W Roosevelt Rd, Chicago 50, Ill

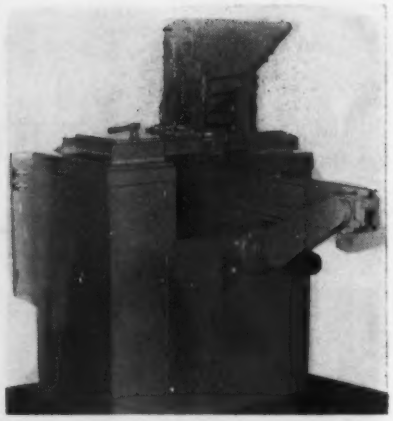


Portable Electric Welder For Light Gage Metals

Heavy-duty Hi-Amp Model 5403 has built-in precision timer, called "Electronic Thyratron Timing Control and Solenoid Contactor." This is said to provide welding accuracy from 1/10th second to a full second.

Wide throat depth of 6 in. can be extended to 18 in. by use of extension arm accessories. Welder's opening is easily adjusted from 3 to 11½ in. Both transformer and welding arms are water-cooled. Output is 3 amp for secondary open circuit voltage and 20,000 for short circuit.

The Sittler Corp, 18 N Ada St, Chicago 7, Ill



Hopper and Conveyor For Automation Setups

An adjustable shaft hopper and adjustable chain feed conveyor have been designed to handle a range of sizes of shafts, or any long cylindrical piece parts to obtain automation on grinding and polishing operations.

Both hopper and conveyor are mounted on rollers on a floor stand, while other end of the conveyor is rigidly bolted to the grinder work-rest slide. As the grinding wheel wears, hopper and conveyor will be maintained in correct relationship.

For tandem grinding setups, conveyor can be equipped with special guide plates which present parts in precise alignment, even though grinders have unequal wheel wear.

Kraus Design, Inc, 925 Exchange St, Rochester, NY

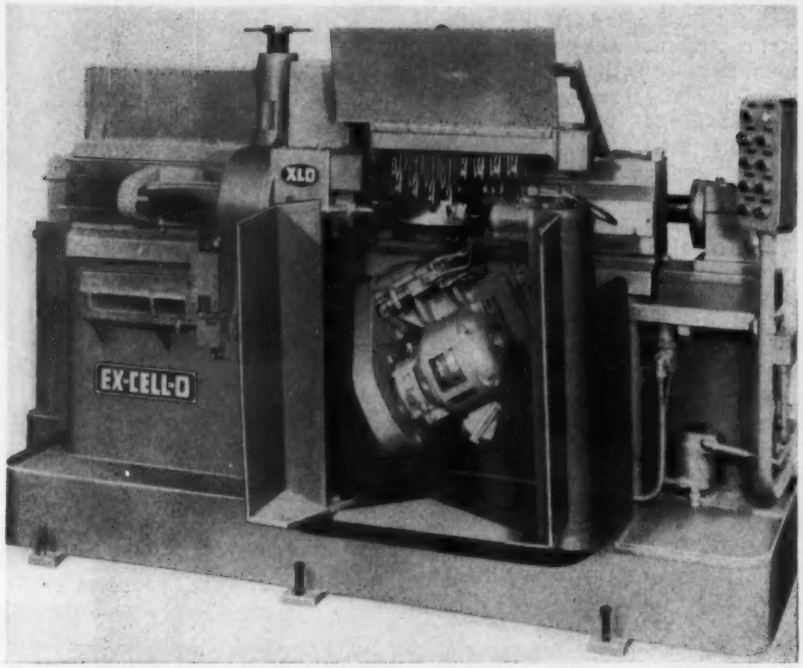
Platen Grinder Increases Coated Abrasive Belt Life

The Curtis 91 employs the principle of a serrated contact belt and serrated contact roll for grinding and polishing flat and radius surfaces.

Unit, developed by Curtis in collaboration with The Carborundum Co, incorporates a 175-in.-long serrated contact belt behind a 226-in.-long abrasive belt. Width can be varied in accordance with customer requirements; present models use 4-in. width up to 8-in. Serrations flex the abrasive belt, setting up a fast cutting action and greater chip clearance. Contact belt absorbs friction against the steel platen; since the abrasive belt runs free, clean, and cool, much finer grit belts can be used resulting in greatly improved finish without danger of burning the material.

Model is equipped with three station tables, adjustable for angle grinding. Three men can work on the machine simultaneously.

Curtis Machine Corp, Jamestown, NY



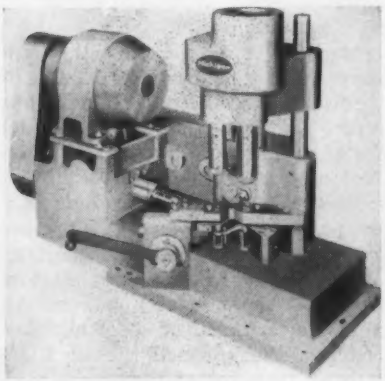
Automatic Blade Profiling Machines

Two new and larger profiling machines have been developed by Ex-Cell-O for milling and grinding the airfoils of forged jet-engine compressor blades. Both take blades having airfoils up to 6 in. wide and 18 in. long.

Style 186 precision profile miller, like the smaller Style 86 introduced several years ago, has a milling spindle with its drive motor mounted on an angular slide on the front of the machine base. It is currently being used on titanium, as well as stainless. Work feeds lengthwise across the milling cutter, and indexes radially after each stroke. Position of the blade relative to the cutter is maintained at all times by an accurately ground steel cam on the workhead which engages a follower on the machine base. Workhead pivots up and down during the milling cycle to obtain the required form on the blade. Roller-type back rests are brought into contact with the work, and are locked hydraulically before each cutting stroke. They provide firm resistance to cutting pressure to prevent deflection, without exerting pressure on the blade.

Style 187 profile grinder uses same type of cam to control work height in relation to the grinding wheel. Instead of the blade feeding lengthwise, as it does in the miller, it rotates, and feeds across the wheel.

Ex-Cell-O Corp, 1200 Oakman Blvd, Detroit 32, Mich



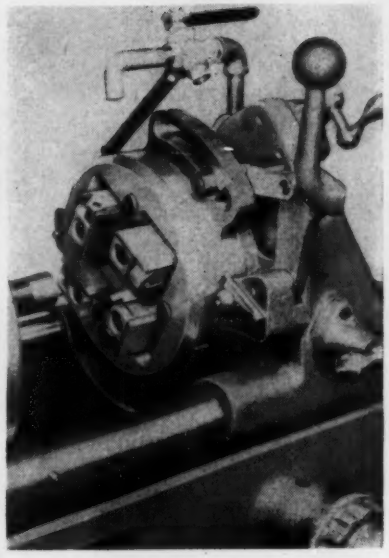
Two-Way Drilling Unit Fits Any Drillpress

Compact, self-contained unit permits right-angle drilling on any standard drillpress, utilizes only one feed source to operate.

After mounting, reportedly simple, units are locked, either manually or automatically, by a cam wedge. Pressure from vertical unit, while drilling, advances the horizontal unit. Feeding of the cross or right angle is accomplished by rack and pinion gears.

Unit illustrated is drilling 4 holes in a gear shift lever. Only 3 spindles are actually drilling these 4 holes—2 vertical holes, and 1 right-angle hole through the split clamping arms. Additional spindles can be provided for either the vertical or the horizontal drilling.

Michigan Drill Head Co, PO Box 4643, Detroit 34, Mich



Stationary Die Head

The Little Lansta is designed for maintenance work in application to the 2-in. Little Landis pipe threading and cutting machine without any machine modifications. Developed primarily to replace the die head previously furnished, it is said to be of more rigid construction and to incorporate an improved mechanism to assure positive locking; 1/3 increase in chaser length is achieved through use of 2¼-in.-long Lanrac tangential chasers. These can be reground for 80% of original length.

The ¾-in. head with a ⅛ to ¾-in. pipe range, and the 2-in. head with a 1 to 2-in. pipe range can be rapidly interchanged because of mounting method. Two heavy-duty pins extending forward from the cross-rail support the head. Attached to the head body are two retaining levers which engage the pins to secure head in the threading position.

Entire pipe range of the 2-in. head can be threaded by making only a size adjustment. When the ¾-in. head is set up to thread ¾-in. pipe, only a diametrical change of the die head is needed to thread ½-in. pipe. A size adjustment can be quickly accomplished by loosening a single clamping screw. No chaser-holder changes are necessary for either head when threading pipe. Holders can be used for either tapered or straight pipe threading.

Landis Machine Co, Waynesboro, Pa

Trepan cutters in diameters under 3/4 in. available in HSS or in special alloy steels. Small work involving tolerances of 0.0002 in. in diameter, and 0.0003 in. in concentricity can be handled in a single operation.

Woodruff & Stokes Co, 353 Lincoln St, Hingham, Mass

Leadscrew Tapping Machine Is Electrically Controlled

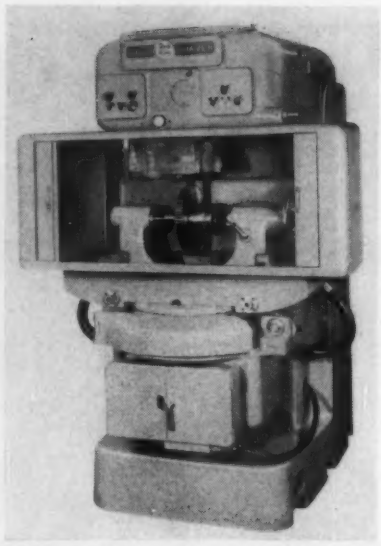
Ettco-Emrick ATU No. 3 automatic leadscrew tapping machine is a self-contained, electrically controlled and operated device designed for fast, precision single and multiple spindle tapping or threading. Neither cams, air, nor hydraulic systems are used; electricity is the only power required.

Utilizing a new principle of forward and reverse electromagnetic clutches, the unit needs no reversing motor and can be operated at extremely high speeds. Built-in rheostat control mounted on the side permits torque of the clutches to be regulated over a range from 0 to the equivalent of 2 hp. This gives the machine the sensitivity required to protect small taps, and the power and torque needed to drive larger taps. Since the clutches are energized within themselves, there is no end pressure on either leadscrew or taps, thus producing a thread as accurate as taps or dies being used. External depth control knob allows tap depth to be controlled to within ¼ turn anywhere within the maximum stroke of 1⅞ in.

Hardened and precision-ground leadscrew which feeds the tapping head into the work runs in a specially leaded split lead nut. Leadscrews and nuts of different pitch may be readily installed by removing two setscrews.

Wide choice of motor drives is available, including direct-mounted fixed speed motors, direct-mounted variable speed, and direct-mounted variable speed geared type. Machine can also be supplied with single or multiple pulley drives. Tap speeds can be designed to suit requirements. Capacities cover a range of from No. 0 to the equivalent of 2 hp. Details available in bulletin No. ATU.

Ettco-Tool Co, 594 Johnson Ave, Brooklyn 37, NY



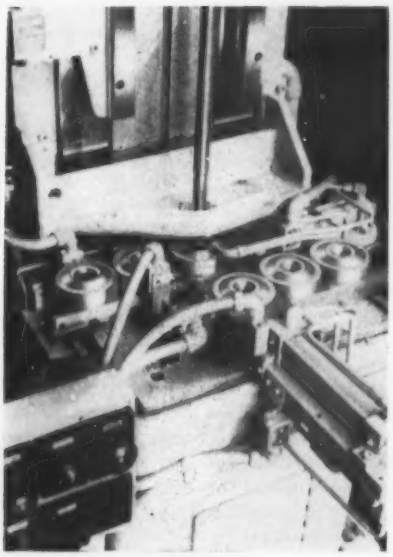
Red Ring Shaver Finishes Gears By Either of Two Processes

New Red Ring rotary gear shaving machine finishes external spur and helical gears by either diagonal or conventional shaving processes. Model GCU-18-in. shaves gears from 2¼ to 18-in. PD having 4 to 16 diametral pitch teeth. Table has a maximum stroke of 5 in.

Unit is available in three types: (1) for diagonal shaving; (2) for either diagonal or conventional shaving; has automatic differential upfeed mechanism; (3) for either process, plus crown shaving.

Machine operation is similar to other Red Ring gear shavers. A 3-hp motor drives the cutter; ½-hp motor powers the table drive. Model is equipped for coolant, and has pushbutton controls.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich



Automated Broaching

Vertical automatic pull - down broaching machine has been designed for automatic conveyor line operation. Equipped with electrical controls and a hydraulic broach retriever, the unit broaches the hole and involute splines in an automatic transmission clutch hub. Retriever follows the broach down during a principal portion of the stroke to provide alignment of the broach. As broach is pulled through the part, retriever follows at a rate which holds the broach in tension.

Machine automatically receives the parts coming in from the line, broaches them, and ejects them back onto the line. Parts coming in actuate a loading cylinder which transfers a part into broaching position.

Hydraulic lift lowers the part until it seats against the inner boss of the previously reamed hole. Retriever lowers broach through the part until shank connects with automatic jaws of the puller.

After broaching, lift raises part, and cylinder ejects it onto conveyor line. Broach is then returned to the retriever, and cycle automatically repeats. Machine runs continuously as long as parts are coming from the conveyor line.

American Broach & Machine Co, Ann Arbor, Mich

High-Production De-Scaling Unit

Model ES-537 Rotoblast cleans both sides of hot rolled sheet, coil, or plate simultaneously at rate of up to 360 sq ft per side per minute.

Machine is equipped with eight standard Rotoblast wheels capable of throwing 480,000 lb of abrasive per hour. Surfaces are said to be descaled so thoroughly that smallest defects are easily observed. A single operator can handle the entire operation by pushbutton controls. Unit takes steel sheet into the blast chamber automatically, blasts top and bottom surfaces simultaneously, removes all abrasive from top of sheet and discharges the cleaned piece. Blast streams from top and bottom hit the sheet at exactly the same point.

Model is approximately 24 ft high, 18 ft wide, and 22 ft long.

Pangborn Corp, Hagerstown, Md

World Sawing Records!

Ask to see the "World Records" Album of samples of DoALL Power Sawing.

Faster Sawing than Ever Before...

The new DoALL Automatic Power Saw is faster than hack saws . . . faster than any other band machine . . . at least 100% faster than any cut-off saw of comparable size and price in the world! Cutting rates up to 15 square inches per minute on ferrous metals. Saves time, labor and *material*, too. Cuts cut-off costs 50% and more.

Turn the page for facts, figures and the answers to your questions.

DoALL

The DoALL Company
Des Plaines, Illinois

WORLD That Sings

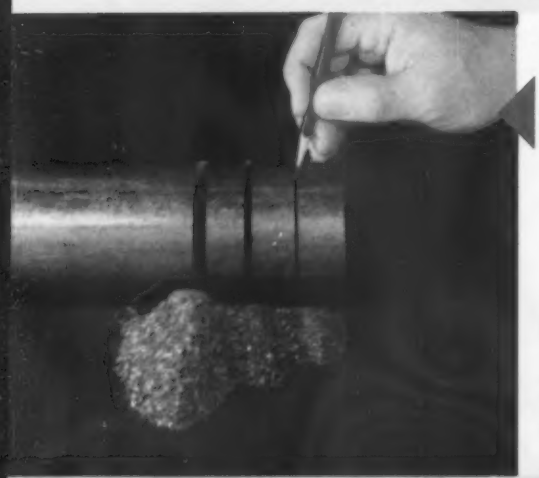
Ask to see the "World Records" Album of samples of material cut on DoALL Power Saws—complete data on cutting rates, accuracy and tool life.

...Here is the (musical) "score"...

a superior melody of cut-off saw performance

MATERIAL	AREA/CUT (SQ. IN.)	BRINELL HARDNESS	SAWING TIME/CUT	SQ. INCH PER MIN.	TOOL LIFE
2" DIA. C-1018	3.14	150	20 sec.	9.42	3000 pieces
6" DIA. C-1018	28.27	152	2.83 min.	10	354 pieces
3½" x 3½" C-1045	12	165	1.2 min.	10	600 pieces
8" x 8" "H" STRUCTURAL STEEL	10.140	—	1.27 min.	8	500 pieces
5" DIA. B-1112	19.63	125	1.28 min.	15	700 pieces
1½" x 2½" REX AA	3.75	212	1.25 min.	3	723 pieces
4⅛" DIA. M-2	12.75	210	4.25 min.	3	206 pieces
1½" x 10" AISI 1095	15	200	2.14 min.	7	220 pieces
5" DIA. 4150-FM	19.63	196	1.97 min.	9.9	300 pieces
6" DIA. TITANIUM TYPE 140-A	28.27	310	35.46 min.	.832	20 pieces
1.5" x 1.5" 52100	2.25	187	.53 min.	4.6	1100 pieces
5" x ¾" WALL CFS1015 TUBING	10	179	1.16 min.	8.6	600 pieces

...Look at these material savings...



Left—Compare the 1/16" kerf of a DoALL Demon continuous-cutting blade with that of a ⅛" hack saw blade or ¼" cold saw blade.

Every 9th Piece a Dividend!

Right—The extra ½" thick blank would have been wasted by a heavy hack saw blade—important cost item with expensive materials.

RECORD CUT-OFF "MUSIC" of Lower Production Costs!

NEW DoALL *AUTOMATIC* POWER SAW
...a *Symphony* of speed and precision

18,000 CHIPS PER MINUTE—that's the output of a 6-pitch DoALL band tool running 250·FPM—clean cut chips produced at a rate possible only with a *continuous-cutting* saw band. The table on the left hand page shows what this means in terms of cut-off production.

HI-FI ACCURACY—.002" accuracy per inch of work thickness in automatic sawing. The slice of 12" high-chrome, high-carbon tool steel round in the "World Records" Album varies no more than .024" in thickness from top to bottom. 50 to 60% of the cuts from a 6" titanium round were accurate in thickness within .005" —none of the 28 cuts in the test run deviated more than .010". No hack saw can cut more accurately.

CONSTANT FEED PRESSURE—the operator sets feed as recommended on the Job Selector and automatic regulation maintains uniform pressure at all points throughout the cut.

FACTORY-SET BLADE TENSION—another DoALL feature that *automatically* keeps blade at correct tautness for maximum production without reliance upon the operator.

INFINITELY VARIABLE SPEED—from 60 to 350 FPM, together with the feed control provides the maximum cutting rate for any job.

DEMON HIGH-SPEED STEEL BLADE—the teeth do not lose hardness even at red heat temperatures, permitting heavy feeds, high speeds and lower cost cutting.

FULLY AUTOMATIC—standard stock indexing adjustable to 24"; greater length available.

Turn the page for the FACTS about Demon High-Speed Steel blade costs . . .

New DoALL Demon High-Speed Steel Blades retain their hardness at temperatures up to 1100° F., permitting cutting rates many, many times in excess of any previous saw band.

Records of DoALL Demon® —High-Speed Steel Blade

In terms of either time or material savings, DoALL Demon Blades on a DoALL Power Saw are the lowest cost blades you can buy. With this team you'll save 4 hours or more per 8-hour day over a comparably priced hack saw. If you paid only $1.00 per hour for labor, the time saving alone would pay the full price of every Demon Blade you used!

If you were cutting mild steel costing as little as 13¢ per lb., the difference between the 1/16" Demon Blade thickness and a 1/8" hack saw blade thickness would result in material savings that alone would pay the full price of every Demon Blade used.

Viewed from any angle you will cut your cut-off costs 50% or more with a DoALL Power Saw and Demon Blade. Ask for complete information today.

See it and believe it! *Ask for a free demonstration* at your plant without obligation. You will be amazed at how the new DoALL Automatic Power Saw with Demon High-Speed Steel Blade slices through metal—just watch your watch while it performs. You'll see it spell out big *time* and *cost* savings every inch of the way. Call your local DoALL Store for a demonstration at your convenience, or write The DoALL Company, Des Plaines, Ill.

Available in welded lengths from your local DoALL Store — 1" wide, 2 to 10 pitch.

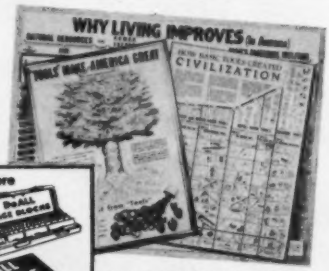
DoALL

The DoALL Company Des Plaines, Illinois

Friendly DoAll Stores . . . (in 37 cities)

Personalized Service . . . Complete Stocks . . . Local Delivery

Call Your DoALL Service-Store
DoALL
SAW BANDS
DoALL GRANITE PLATES
Machine Tools • Cutting Tools • Measuring Instruments
Shop Supplies • In Stock
The DoALL Company, Des Plaines, Ill.



EDUCATIONAL STUDY WALL CHARTS

Economic Principles

$1.00 each postpaid

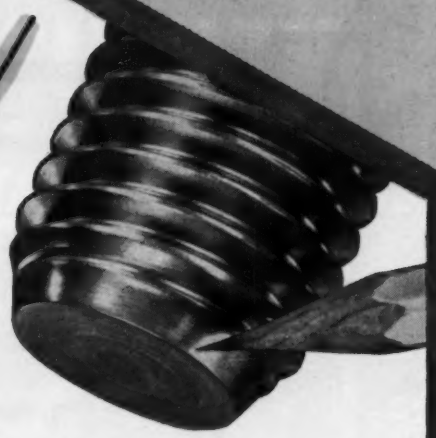
Lower quantity prices

NOW

The Leader in Stainless Socket Cap Screws

OFFERS YOU

THE LEADER POINT



Allen's unthreaded Leader Point permits easier starting, reduces the possibility of cross threading, protects threads from damage if the screw is accidentally knocked or dropped. Your Allen Distributor stocks the largest range of sizes in 18-8 stainless cap screws available anywhere . . . 97 standard sizes #4 x 1/4" to 5/8" x 3" with NC threads; #10 x 3/8" to 3/8" x 1 1/2" with NF. Be sure to specify genuine Allen Leader Points.

Also standard with Grip Heads in popular sizes.

ALLEN

MANUFACTURING COMPANY

Hartford 2, Connecticut, U.S.A.

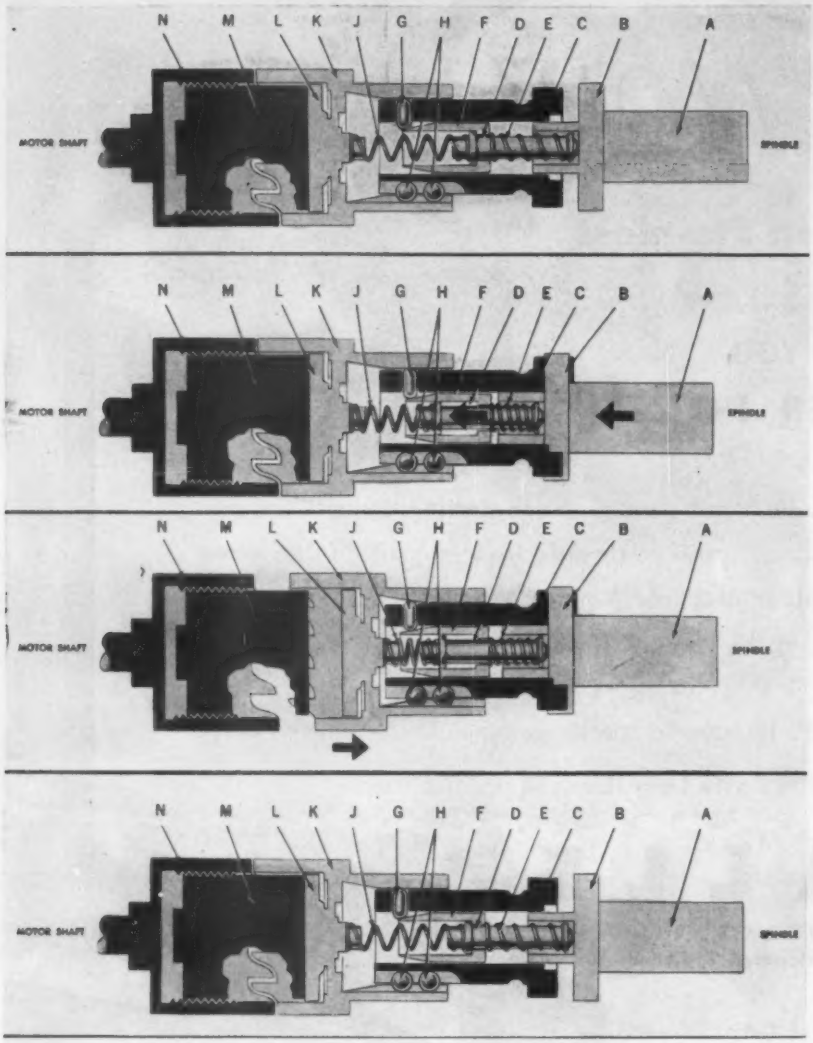
STAINLESS SET SCREWS

With the improved Allenpoint, available from your distributor in 54 standard sizes #4 x 1/8" to 1/2" x 1" NC and #10 in lengths from 3/16" to 3/4" NF.

Sold only through leading Industrial Distributors.

Personalized Service . . . Complete Stocks . . . Local Delivery
The DoALL Company, Des Plaines, Ill.
Lower quantity prices

Now—An Accurate Torque Clutch for Power Tools



Idling position, with motor shaft running, spindle A and clutch pin B free. There is no axial pressure through spindle, so spring J holds latch pin D forward, which keeps clutch pin B from engaging clutch jaw C. Magnet M holds armature plate L, keeping lower jaw K engaged with upper jaw N

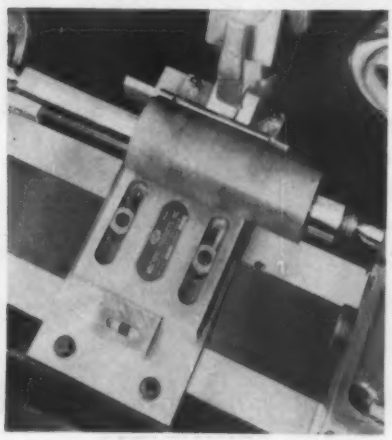
Tool on work produces axial pressure, forcing spindle A back, and making clutch pin B engage with clutch jaw C. This makes spindle A rotate, driving screw or nut. Latch pin D is also forced to rear, compressing spring J. Lock pin G prevents latch sleeve F from moving back, so spring E is compressed

At desired torque, lower jaw K cams out of engagement with upper jaw N against magnetic force. When space between armature plate L and magnet M is 0.015 in., magnetic field is passed, and lower jaw K is thrown further forward. Inside taper on jaw K lets lock pin G move out, and allows tapered latch sleeve F to be pushed rearward by spring E. This jams the jaws open instantly, preventing engagement while tool is on work

Tool is pulled back from work, everything resets to original condition. Spring J pushes pin D forward, disengaging pin B from jaw C. Latch sleeve F moves forward, releasing lock pin G, and letting lower jaw K move back until magnetic pull seats armature plate L against magnet M. Now magnetic clutch is engaged, and tool is ready for next operation

Adjustable-torque power wrenches and screwdrivers have had several disadvantages in the past: Air pressure can be adjusted to stall turbines at a given point, but control is not accurate over about 500 rpm; mechanical clutches can be adjusted to slip, but most of them ratchet, and the impacting often loses the delicate control over fasteners. A new clutch principle, using a magnet as part of the mechanism, may answer these criticisms.

Chicago Pneumatic Tool Co, 8 E 44th St, New York 17



Centerless Grinding Fixture

Fixture converts any between centers grinding machine to a centerless grinder. Unit provides all elements necessary for accurate grinding of round work without need of setting it up between centers. Through-feed, plunge cut, or form and in-feed operations can all be performed.

Lightweight unit can be set up or removed in minutes, making it practical for job lots of a few pieces, as well as long production runs.

The fixture provides the functions of a large centerless grinder in that the grinding wheel and an opposed regulating wheel form a throat through which work passes while being supported on a work rest blade. Machine the fixture is applied to provides the grinding wheel and its motivation. Fixture provides the regulating wheel and the work rest blade support with the means to secure alignment and adjustment for various diameters of work. Regulating wheel is mounted between the centers on the machine, and is rotated by a drive pin in the headstock drive plate.

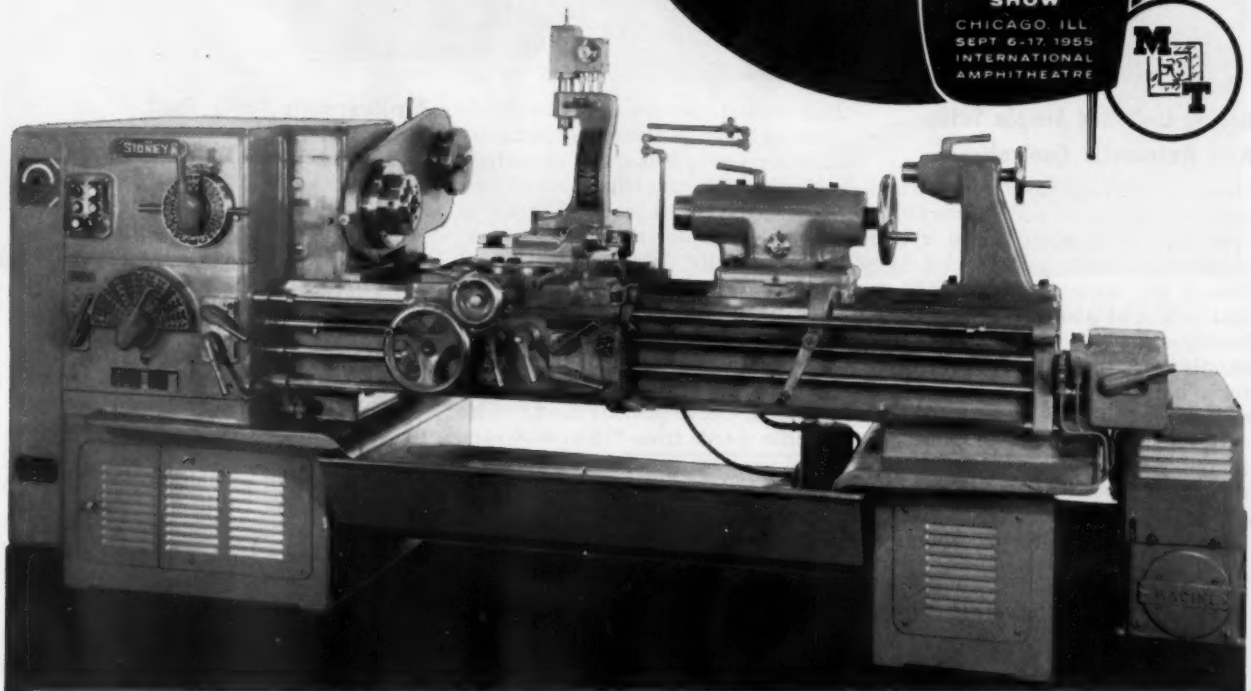
Additional information contained in bulletin 109.

S & E Machine Products, Bridgeport, Mich

The future is here NOW in these labor-saving, cost-saving . . .

SIDNEY FLUID TRACER LATHES

THE MACHINE TOOL SHOW
CHICAGO, ILL.
SEPT. 6-17, 1955
INTERNATIONAL AMPHITHEATRE



★ STARRED AT THE MACHINE TOOL SHOW
CHICAGO, SEPT. 6-17, 1955
SPACE 1116 EXPOSITION HALL

THE SIDNEY MACHINE TOOL COMPANY · over 50 years of service to AMERICAN INDUSTRY · SIDNEY · OHIO

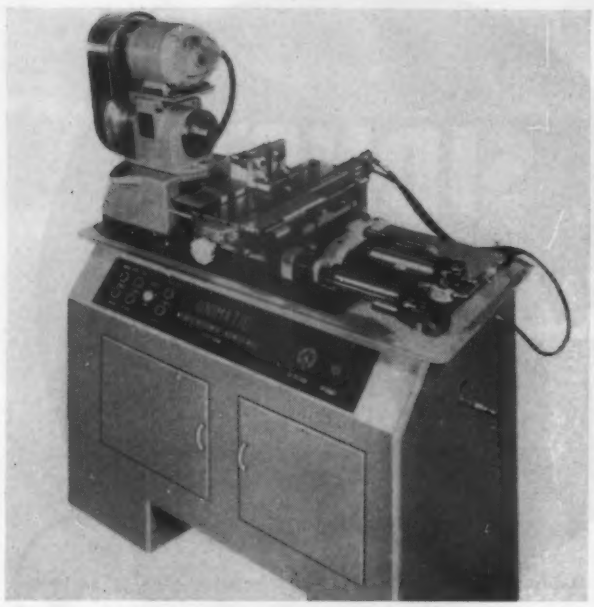
Your future is safe, too, when you entrust your cutting operations to Sidney Lathes. You are assured many years of faithful, reliable service, low maintenance costs and the MOST ECONOMICAL PRODUCTION AND IMPROVEMENT OF YOUR PRODUCTS.

The sensitive tracer head transfers every change in contour from the master piece or template to the cutting tool regardless of size, shape or quantity. Change-over to standard lathe operation or back requires only a few SECONDS since no addition or removal of extra parts is required.

See this and other models at the show . . . or write for bulletins.

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



Boring Unit Has Simple Setup And Automatic Controls

Unimatic machine has automatic and manual controls, with timers for repetition of predetermined cycles for cutting, dwell, and reverse motion of the table and cross slide so that unskilled labor can perform uniformly precise work. Unit will handle work up to 9-in. dia and perform boring operations to a depth of 6 in.

Headstock has built-in sine bar to implement accurate boring and turning of tapers. Air-operated spindle brake, and complete, motorized coolant facilities are incorporated. Full round table-ways and guide bushings, and a floating support assure correct tool position regardless of contraction and expansion of machine parts because of changes in weather and temperature. Heavy, black granite base, ground and lapped to accuracy of 0.00005 in., versatile cartridge-type ball bearing spindle, and a complete line of accessories contribute to flexibility.

Motor is a ½-hp, 1750 rpm, totally enclosed, sleeve bearing design, with spindle speeds from 775 to 4000 rpm. Total weight is 1200 lb; required floor space, 28x52 in.

Atlantic Instrument Corp, 90 Broadway, Norwood, Mass

Air-Hydraulic Table Feed For Small Parts Production

Air-operated, hydraulically controlled table feed has been developed for the four models of Burke bench millers.

Millers can be equipped with either 16 or 20-in.-long tables; an 8-in.-stroke air motor can be used on either table, together with an 8-in.-stroke hydro-check valve, and suitable limit switches, transformers, and solenoid valves.

Table is adaptable to a wide range of applications including milling, sawing, facing, slotting. Distance and speed of the rapid traverse approach, cutting feed and length, and rapid automatic return are easily varied according to particular job requirements. In addition to increased production and lower costs, the feed produces better machined finish, and longer tool life.

US-Burke Machine Tool Division, Cincinnati 27, Ohio

Portable Drillpress Has Magnetic Base

A lightweight, portable, magnetic drillpress said to have drilling speed and accuracy equal to conventional drillpress, locks in place by means of powerful magnetic base which permits operator to drill at will without physical strain. Called Portomag, the unit is available in three models for standard heavy-duty drill capacities of ⅝, ⅞, and 1¼ in. By incorporating reversing switch, tapping up to 1-in. capacity can be accomplished.

A magnetic control switch has four positions: low for positioning drill bit to punch mark location; medium and high for holding while drilling; and a demagnetize position. Safety feature is that unit clings securely if electric current is disconnected. Convenient built-in light serves as spotlight for locating bit and signal light to indicate on and off condition of the magnet base.

The magnetic base action withstands direct pull of from 1000 lb for small unit to 2000 lb for large. Small model is 2 in. wide and will drill within 1¼ in. of wall. Narrowness permits drilling in tight spots.

Lupear Tool & Die Co, 32681 Northwestern Highway, Farmington 4, Mich

Stainless steel wire, Type 302 Blue Label Stainless, has been developed with more restricted analysis range. This is said to have improved corrosion resistance, coiling properties, and ability to take sharp bends. Uniformity of temper from coil to coil is reportedly greatly improved.

Webb Wire Div, The Carpenter Steel Co, New Brunswick, NJ

End mills, 3-fluted, single-end, are available (long style) in flute lengths from 1¼ to 4 in.; short style from ⅜ to 2 in. The 3-flute, double-end mill is furnished in lengths from ⅜ to 1¾ in.

Arrow Tool & Reamer Co, 418 Livernois Ave, Detroit 9, Mich

Rockwell-Built DELTA Cut-off Machine

1200 cuts in one hour . . . to tolerances .002"

FOR CHASE BRASS & COPPER

In its Chicago warehouse, Chase Brass and Copper Company cuts large quantities of brass, copper and steel stock (ranging from ¼" to 3¼" in diameter) to *exact* dimensions. But they had not been able to find a cutting method with enough precision and speed to keep production up and costs down. Both time and material were being wasted. Then a Delta Cut-off Machine was put on the job.

According to Mr. William Woll, Sales Service Manager, the Delta machine gives them the combination of speed and precision they need. It not only makes accurate cuts faster, it also produces cleaner, smoother work. As an example of the Delta Cut-off Machine's speed and accuracy, Mr. Woll reports that *in just one hour, one worker made twelve hundred cuts on 3¼" O.D. gilding metal—to plus or minus tolerances of .002"!*

Although this Delta machine has been in constant use for more than five years, Mr. Woll reports: "We've never had to call on Delta for service."

Check These DELTA Cutting Speeds . . .

Material	*Size*	*Cutting Time (in seconds)*
Cast Iron	1½" x 1½"	8
Steel Tubing	1⅛" Dia. x 1/16" Thick	1½
Hot Rolled Steel	2" x 1½"	31
S.A.E. 3140 Steel	1" Dia.	8
Steel Channel	3"—5 lb.	15
Angle Iron	2" x 1½" x 3/16" Thick	5
Brass	2" Dia.	9
Copper	1¼" Dia.	6
Brass Tubing	1⅞" Dia. x 5/32" Thick	2¼
Copper Tubing	1¼" Dia. x 1/16" Thick	1
Aluminum Tubing	1¾" Dia. x ⅛" Thick	1
Brass Angle	2" x 2" x ¼" Thick	1½
Copper Bar	4" x ¼"	2

Why not see how the Delta Cut-off Machine can give *you* faster, more accurate cutting at lower cost. Let your Delta Dealer *demonstrate*—he's listed under "TOOLS" in the classified pages of your phone book. Send coupon for full details.

DELTA ROCKWELL **DELTA** QUALITY POWER TOOLS

Another Product by **ROCKWELL**

DELTA QUALITY COSTS NO MORE

Delta Power Tool Division, Rockwell Manufacturing Co.
618-G North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send name of my nearest Delta Dealer.
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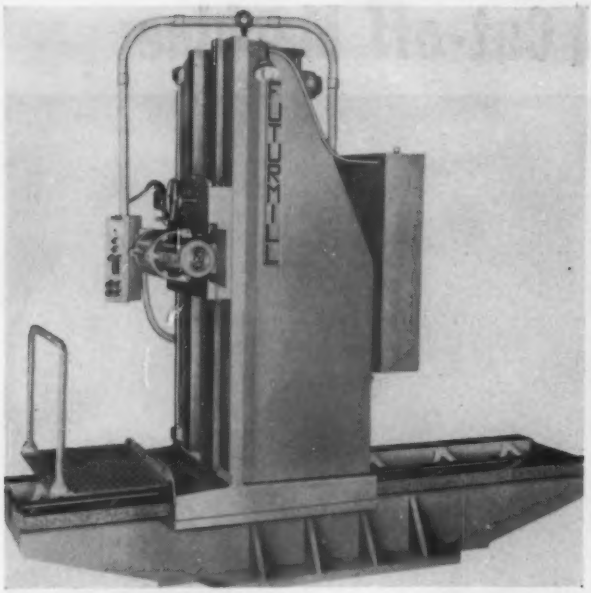


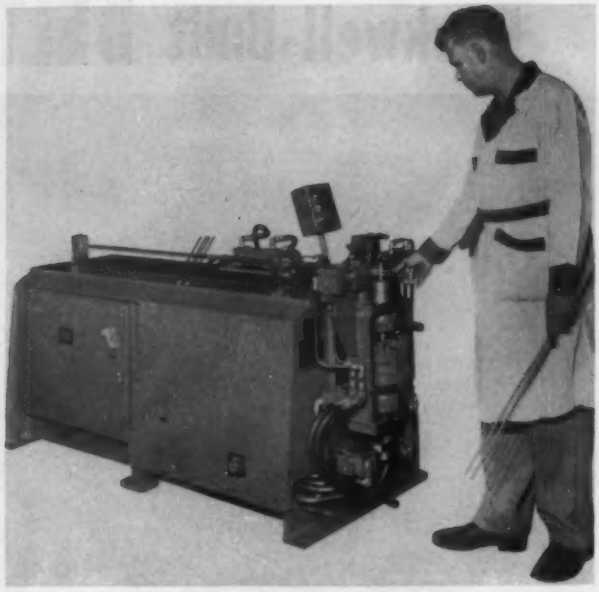
Machine Designed for Milling Structural Beams and Girders

Floor-type milling machine has been engineered by Futurmill primarily for milling the ends of structural beams and girders.

Unit has a vertical range of 77 in.; horizontal range of 108 in. can be increased by lengthening the bed. In order to eliminate vibration for carbide milling of thin sectioned H or I beams at high feed rates, all spindle gears have been done away with. The 20-hp nominal, 30-hp effective, General Electric powered motorized milling head runs at 1200 rpm, giving 1200 sfm with a 4-in. cutter and 900 sfm with a 3-in. cutter. Four feed rates of 40, 60, 80, and 120 ipm are provided for both vertical and horizontal movement; the 5-hp four speed drive motors are equipped with magnetic brakes for instantaneous stoppage. Spindle extension of 10 in. is provided on ways 12 in. wide; extension can be increased if desired. Hand micrometer adjustment is provided for both movements, and spindles for drilling or boring can be quickly interchanged. A Detroit Milling Cutter Co "Loadmeter" in the control panel automatically shuts off feed motors when spindle motor is either overloaded or overheated.

Machine as illustrated weighs in excess of 10 tons. A 360° rotating base is offered as auxiliary equipment, as well as a tilting base, so that unit can be both rotated and tilted to machine a compound angle on large or long structural members which are difficult to swing to desired positions. The column only can be adapted to an existing rotary planer base.

Futurmill, Inc, Pontiac, Mich



Tube Bending Machine Has Automatic Cycle

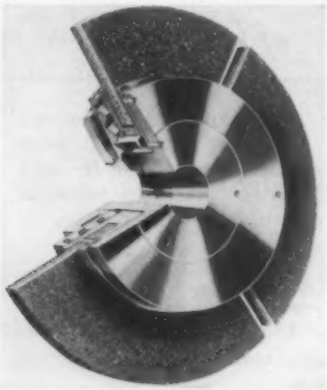
Automatic-cycle tube bending machine, said to be low in cost, will simultaneously form two 180° hairpin bends in ferrous or non-ferrous finned or plain tubing in a cycle time of less than three seconds, according to the manufacturer.

Bending table on end of machine is powered by a high-torque, positive displacement, single-vane hydraulic actuator. Radius bender block and hydraulic cylinder controlled clamp block are mounted on the table. Hydraulic cylinder controlled wiping block is mounted on machine base in contact with radius bender block. This arrangement permits bending light-wall tubing on small radii without flattening or lengthening, and without use of ball mandrels.

Manual insertion of the tubing causes hydraulic cylinders to position the clamp and wiping blocks. Tubing is bent by radial movement of the hydraulic actuator controlled bending table. It is released, ejected, and manually removed before table returns to start position. Pushbutton controls are provided for setup operations. These can be used for manual control of cycles.

Machine has a single-tube capacity of up to 1-in.-dia. The center-to-center bend radius that can be formed is proportional to the tube diameter and wall thickness. Bends having legs up to 4 ft in length can be handled. Welded base houses electrical controls, 5-hp motor, and 12-gpm hydraulic pump. Floor space is 30x72 in.; 32 in. high over-all.

Water P Hill, Inc, 22183 Telegraph Rd, Detroit 19, Mich



Constant Diameter Grinding Tool

Kodiak tool for all types of grinding operations is said to provide substantially increased efficiency and decreased grinding costs.

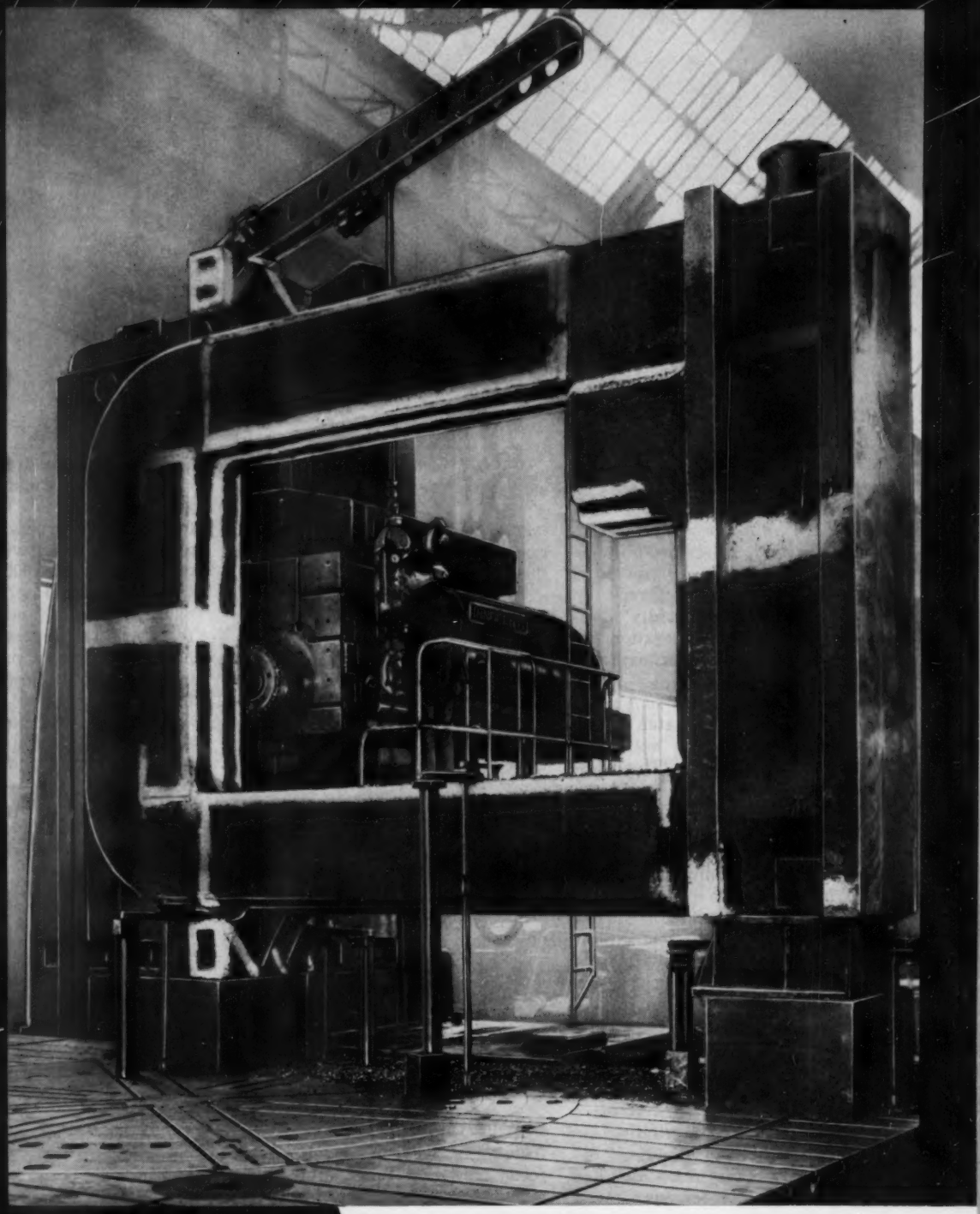
Adjustable hub holds abrasive segments; built-in scroll plate permits adjustment of segments, which are locked into place by the same method as a scroll chuck. Constant peripheral speed is maintained by slightly increasing diameter of tool before each wheel dressing. Wide range of adjustment assures maximum usefulness of segments. Equivalent of an extra 1½-in. dia on a standard 7-in. grinding wheel can be used without altering peripheral speed or diameter.

Open slot between abrasive segments acts as air or coolant pump, directing stream onto surface being cut for faster removal of stock and better finish. Tool fits all standard grinding machines.

Distributed by Continental Products, Dept 2G, 872 E 140th St, Cleveland 10

INNOCENTI

Lic. CWB



Milling and boring
in one setting of a
rolling mill upright of 140 tons
on a
MILLING AND BORING MACHINE - INNOCENTI - C.W.B.
Type FAFT 305-200
Power available at the milling
cutter: 60 HP

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MILAN **NEW YORK** **PARIS**

Information and literature from: Innocenti Corporation, Dept. AM, 43 W. 61st Street, New York 23, N.Y.
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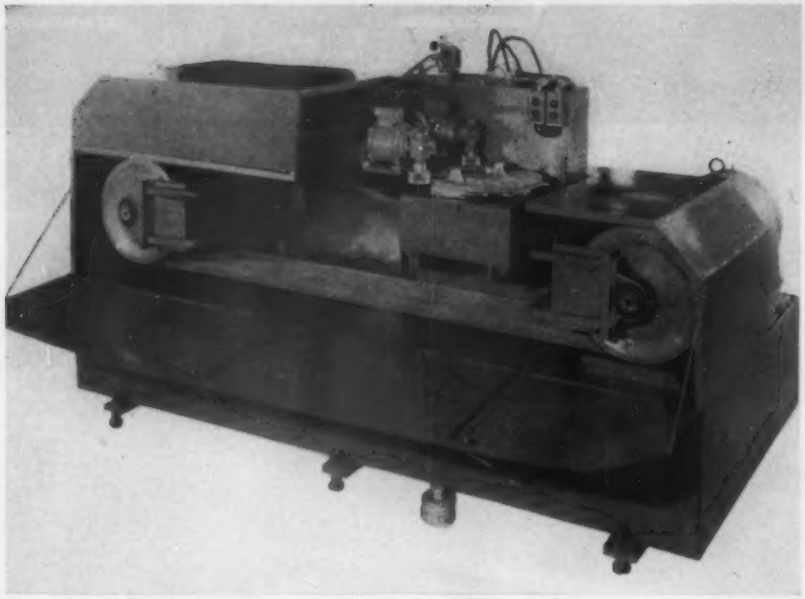


Speed Surfacer Has Magnetic Platen And Simplified Work-Turning Device

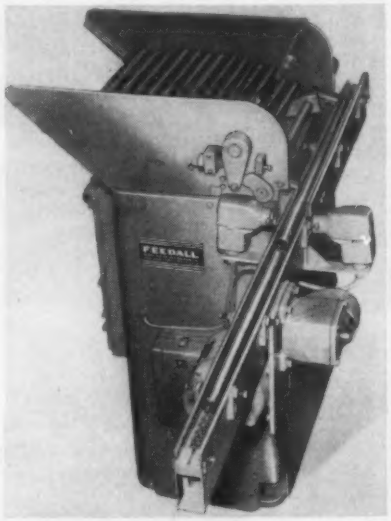
Fenlind Model 16 speed surfacer, a coated-abrasive, belt-type unit, is designed specifically for producing a true, finished starting surface on rough castings. It reportedly minimizes rejects in any operation involving rough, semi-finish, or finish grinding.

Work is held in position on the belt over a magnetic platen which pulls work against the belt with strong, uniform pressure. This pressure is adjustable from 0 to 185 psi, giving operator a choice of cutting speeds for all types of work.

Workholding fixture consists of a 16-in. wooden or aluminum disk. Interior is cut out to conform with the shape of the casting in such a way that the disk will rest on the casting in a position parallel to the surface to be finished. On the side toward which the belt is moving are two knurled spindles, eccentrically mounted on motor-driven shafts. Disk rides against these spindles, which rotate and oscillate the piece across the belt, reportedly assuring absolute uniformity of grinding action. Hydraulic workholding devices are also made to be mounted for finishing non-ferrous metal pieces.

Model 16 takes a 16-in. belt 18 ft in length. Surfacer is also available for 8, 12, and 20-in. belts. Driving drums are powered by two 15-hp motors producing a surface speed of 7200 fpm. Drum on LH end is equipped with a pneumatic tensioning device. Unit can be used for wet or dry surfacing. Lateral carbide laminations protect surface of magnetic platen from wear. Platen has its own water-cooling system.

Fenlind Engineering Co, 5602 Pike Rd, Loves Park, Ill



Automatic Bar Feeder

Automatic feeder, Model 1700 B, feeds bars and tubes to centerless grinders, polishing machines, heat treating, and similar equipment.

Unit illustrated will convey parts ¼ to 1½-in. dia, and 6 to 26 in. in length at any desired, constant speed of 5 to 20 fpm from hopper to machine. Other models are available up to 60 in. in length and at various rates of feed. Cycling controls: photoelectric relay or mercury switch.

Feedall, Inc, Willoughby, Ohio

Special Mandrels

Two special mandrels recently designed by Le Count are a seven-jaw and a four-jaw model. Both are for precision production work and were delivered with guaranteed concentricity of 0.0002 in. TIR. Both specials incorporate Le Count's expanding and hand manipulation features. The latter feature saves handling time in production finish operations by eliminating the need for an arbor press.

Purpose of the seven-jaw special is to locate in seven machined cam grooves of a hardened steel component. The four jaw mandrel is to hold a square-hold die bushing for precision periphery finishing.

Le Count Tool Works, Inc, 390 Capitol Ave, Hartford, Conn

Universal 3-Way Angle-Set Vise

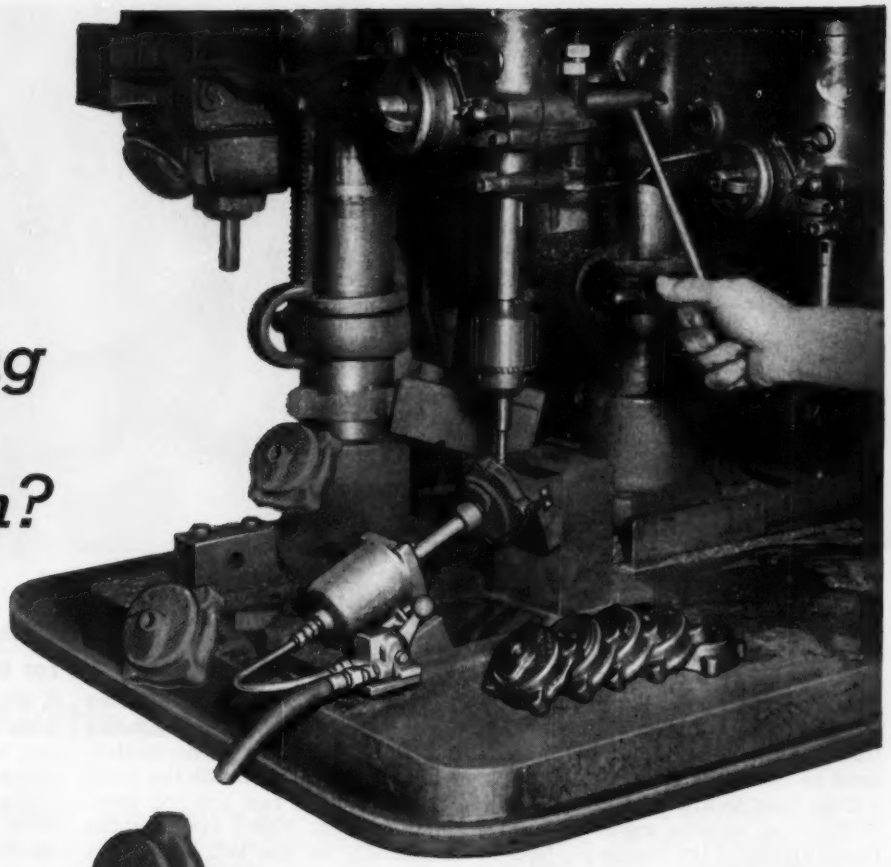
Model No. 3 universal 3-way vise, designated Grinders Model, is designed particularly for compound and simple angle grinding.

Vise has a 3¼-in. jaw opening, with jaws 2¾ in. wide, and 1 in. high. Unit is 4¼ in. in height in the flat position and 9¾ in. high when set at maximum angle. It is fully adjustable in three planes with 360° swivel base; both cradles are adjustable to 90°. The 20-lb device has a square base for squaring against the rail of the magnetic chuck. Both cradles are individually lockable at any angle by means of wedge locks providing set positions that will not change.

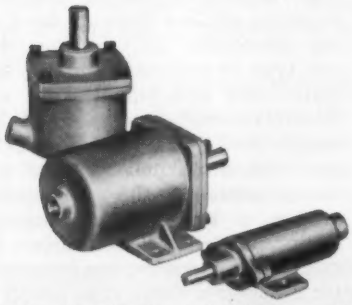
Two larger sizes are available for general machining operations.

Universal Vise & Tool Co, Parma, Mich

Clamping Problem?



SCHRADER has the answer!



Schrader Air Clamping Cylinders are available either base or leg mounted, in 1", 2¼" and 3" diameters delivering a 2" or 1" stroke. A wide selection of Schrader Valves is available to operate this equipment.

Schrader

REG. U. S. PAT. OFF.

Leaders in air control since 1844

The **Schrader Air Clamping Cylinder** is actually a bantam air cylinder that can *add several minutes* to each worker's production hour . . . eliminate the need for slow, manual clamps.

Think of all the clamping operations in your own shop. Milling machines . . . drill presses . . . power presses . . . welders . . . gluers — and many dozens of other machines that are now idling for ten or fifteen seconds while operators go through slow clamping operations. Why not save time — and operator annoyance — with fast, convenient Schrader Clamping Cylinders, as so many other industrial plants have already done? Remember, you can mount these Schrader Clamping Cylinders anywhere — and actuate them automatically or manually.

For full details on the models available — or any of the hundreds of air control products in the complete Schrader Line — write today. Or, if you prefer, fill out the coupon below.

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. E-7.

I am interested in more information on _____

Name _____ Title _____

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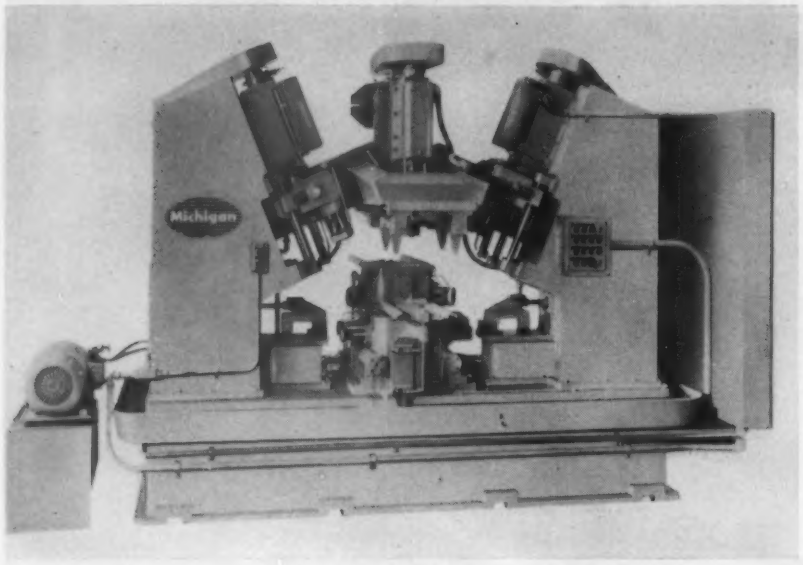


Special Automatic Drilling Machine Has 8-Spindle Angle-Matic Head

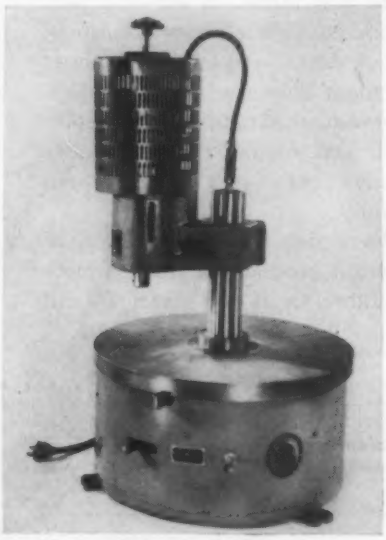
Special automatic drilling machine, designed for drilling automobile frames, has an 8-spindle Angle-Matic head as one of its components.

Unit, built to JIC standards, drills 19 holes at various angles in each frame at rate of 160 frames per hour. Machine automatically positions frame over locating pins. Automatic clamps secure it in place, and all tools advance. Coolant, too, is supplied automatically.

Components consist of two 5-spindle drill heads, and one single-hole driller, mounted on self-contained power units, and one 8-spindle Angle-Matic head. Two of the spindles in the latter head are fed horizontally to the left, parallel with the front of the machine; two are fed horizontally to the right; two are fed horizontally to the left, at 60° to the front of the machine; and two spindles to the right at 60°, using only one feed mechanism.

After all 19 holes have been drilled, frame is unclamped, raised to conveyor height, and ejected.

Michigan Drill Head Co, PO Box 4643, Detroit 34, Mich



Electric Indexing Table

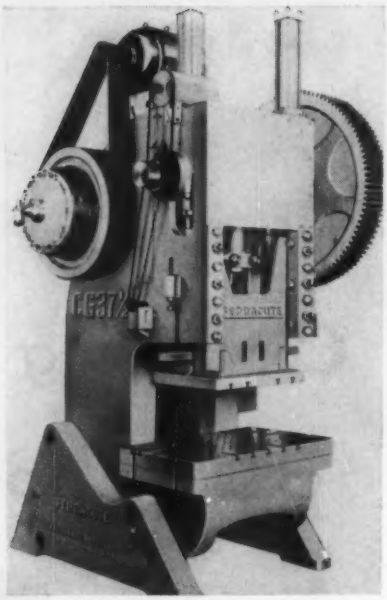
Table for automatic work-positioning has a central column on which tools may be mounted. Model is available both as a packaged unit with the company's electric impact hammer (Electropunch) which stakes, rivets, or marks automatically with the cycling of the table, or, separately, for use with other automatic tools.

Built-in automatic timer is continuously adjustable from 6 to 54 indices per minute and automatically triggers the tools when the table locks in position. A 1/20-hp gearhead motor furnishes power. Automatic timer triggers a solenoid that operates a clutch on a cam. With each rotation of this cam a Nylon roller advances the table one station with Geneva action.

The 15-in. table is locked securely by a ground pin engaging hardened, tapered bushings. Repeat accuracy is 0.001 in.; backlash, according to the manufacturers, cannot occur.

Table will take eight 3¾-in.-dia station fixtures; time for motion during one index is 0.693 seconds.

Black & Webster, 445 Watertown St, Newton 58, Mass



200-ton OBI Press Designed For Quick Start-Stop Operations

A 200-ton open back inclinable press, with box-type counterbalanced ram, will be shown at the Machine Tool Show in Chicago.

Standard equipment for Model CG 37½ includes a new air-powered, electrically controlled friction clutch with interconnected brake and single point adjustment, reported to provide a quick and extremely accurate control for start-stop operation.

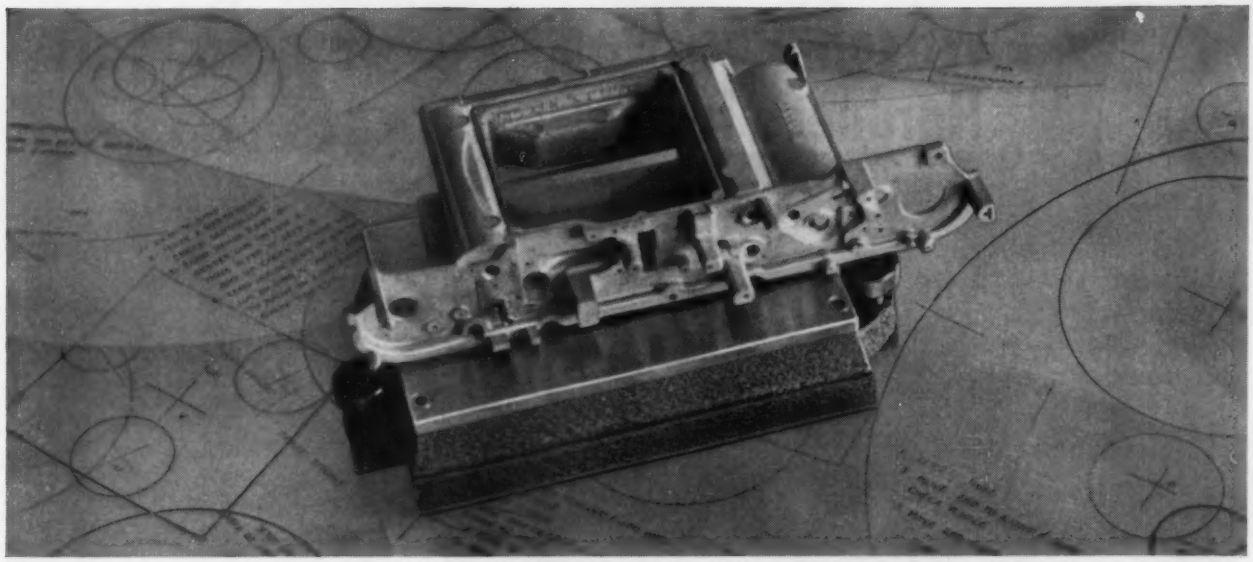
Press, also available in 110- and 150-ton models, is designed to meet requirements of cutting, punching, stamping, shallow drawing and forming operations. Unit accommodates any type of automatic or semi-automatic feed attachments. For completely automatic operation, single or double feed rolls, ratchet-dial, friction dial, magazine, or chute feeds can be combined with a hopper, lower cam, or knock-up and inspection station. Model C Dayton-Rogers bed-mounted die cushion can be installed for drawing medium gage metal. The three presses have automatic lubrication.

Additional details are contained in catalog No. 32.

Ferracute Machine Co, Bridgeton, NJ

Tap reconditioner, called Tapmaster, can be set up quickly to regrind taps in sizes from No. 10 to 2½ in. inclusive. Permits controlled radial clearance, maintains concentricity of chamfer with pitch line, and has a graduated scale which eliminates need for fixed cams to control backoff.

Component Parts Co, Box 504, Whittier, Calif



How Graflex, Inc., *cut production costs* with a Kodak Contour Projector

If you've been thinking of optical gaging only in terms of toolroom measurement or final inspection, see what it does when linked to production operations.

GRAFLEX, INC., was producing a complex precision part in which spacing of 40 holes and 12 bosses had to be held to ±.001".

To solve this tolerance problem, Graflex used a Kodak Contour Projector because: (1) mechanical gages would have been too costly for the required run; (2) optical gaging would be faster; (3) the Kodak Contour Projector gave a quantitative as well as qualitative check.

Here's how this helped cut production costs and speed the work:

Optical gaging made it possible to check parts as they were run, to discover errors before more time and labor were spent on the part; no expensive machining was wasted on parts later found to be out of tolerance. It assisted in assembly operations, too, since the exact condition of the parts was known. And the part could be quickly rechecked at any point during production when a question of tolerance or condition arose.

A Kodak Contour Projector was also used in final inspection—doing in 20 minutes a job estimated at 4¾ hours by surface plate inspection. When the run was completed, the comparator was available for another job.

Perhaps you have production problems that can be solved by fast, accurate, *complete* measurement and inspection. There's a field representative in your area who can evaluate your needs for you. To get in touch with him, or for a copy of the illustrated booklet "Kodak Contour Projectors," mail the coupon below.

Graflex, Inc., used a Kodak Contour Projector, Model 2A, for this operation. The Model 2A is completely equipped for precision micrometry. In addition, it has a magnification selector, built-in surface illuminator, and permits the staging of parts in any plane. As with all Kodak Contour Projectors, it requires no hood.

the KODAK CONTOUR PROJECTOR

EASTMAN KODAK COMPANY 90

Special Products Sales Division, Rochester 4, N. Y.

☐ Please send me a copy of your booklet "The Kodak Contour Projectors."

☐ Put me in touch with your representative.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____
(Zone)

Kodak
TRADE-MARK

an ACCO product

Wilson "Rockwell"* Hardness Testers

SET-O-MATIC* DIAL GAUGE

Eliminates human error. Operator merely applies minor load and taps depressor bar. No setting of dial to zero.

OTHER FEATURES

- Major load applied under dash pot control
- Major load removed by motor
- Illuminated Dial Gauge
- Illuminated Penetrator

Eliminates Operations... Increases Tests per Hour

All you have to do with the Model Y WILSON "ROCKWELL" Motorized Hardness Tester is apply the minor load and tap the major load depressor bar. The machine does everything else automatically. The cycle of Major Load operation may be less than 2 seconds.

This speed of test means great savings in time which will reduce your hardness testing costs. Yet it is done to Wilson's high standard of accuracy.

The utter simplicity of setting the SET-O-MATIC* dial gauge eliminates human error. The operator does not have to set the dial. The large pointer is automatically brought to "SET" position when the minor load is applied.

The Model Y Motorized WILSON "ROCKWELL" Hardness Tester is in production and orders are being accepted for early delivery. Write today for descriptive literature and prices.

*Trade Marks

ACCO

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

230-B Park Avenue, New York 17, N. Y.

plus BRALES and TUKON

ROUND TABLE Discussion

BLUEPRINT FOR ERROR

If errors in production can be traced to bad blueprints, should the blame rest on Engineering, or on the worker who tries to interpret the poor prints? Is there any line at which prints should be returned for illegibility?

IT IS unbelievable that in this age of high accuracy in diesel engines, steam turbines, jet engines, etc, there are still machine shops that rely upon scaling a blueprint to be sure that dimensions are correct. Forty years ago we had drawings with the notice "do not scale dimensions" printed thereon, and for the last 20 years or so no self-respecting shop would think of listening to the mention of a scaled dimension. Anyway, who would think of checking the nearest 0.0001 in. on a print with a scale?

Al, as a foreman, is to blame for allowing the scaling practice to flourish among his men. He cannot be ignorant of the condition of the prints on the floor. Or do they still use prints shellacked to a cardboard backing until the cockroaches eat up the shellac? Mullins is also to blame, but he is not the boss and has not been properly instructed. The engineering department cannot know that the prints are no good unless somebody tells them, but if there is previous history of their taking the complaints as shop nuisance, this is as good a chance as will ever happen for Al to bring things out in the open and raise the roof.

The management will undoubtedly recognize that the 20 to 50¢ cost of a new blueprint is nothing compared to

(Continued on page 192)

"We ain't going by for Ted—we're late for work already!"

FULLER BRUSH SETS THE PACE

with Improved Power Brush Machines

Send coupon below for literature on New Machine

Make Use of FULLER BRUSH Engineering Service

NEW set-up opportunities, increasing production, are offered by the advanced design of this new Fuller Brushing Lathe and "universal" Work-piece Holder.

The lathe introduces a reversing spindle, which provides in the same cycle, a time-saving, two-directional brush attack. Also, 4 choices of power and a variable speed drive permit coordination of speeds to worn or small brush diameters — for maximum removal consistent with desired finish. Both off-hand and power manipulated applications can be arranged.

With the "universal" Work-piece Holder set-ups are given the most efficient position — vertical, horizontal, radial, angular or longitudinal — with power manipulation and reversing action. When desired this machinery can be equipped with controls for quality protection and for automatic cycling on production runs.

In addition to this new metalworking machinery, Fuller Brush has for many years engineered and built special brush machines for all industries. This experience is available for help on your unusual problems.

FULLANCHOR Super-Balance WHEEL BRUSHES . . . reduce vibration, improve work-piece finish, decrease brush wear . . . because brush filaments are precision-spaced for precision-balance.

FULLER BRUSH

MAIL COUPON TODAY!

BONUS OFFER

We will give you, ABSOLUTELY FREE, this handy, time-saving slide chart that gives wheel brush specifications with a flip of the wrist . . . when you send the coupon for help with your brushing problems.

The Fuller Brush Co.
3666 Main St.
Hartford 15, Conn.

Please send me your Free Wheel Brush Selector and your literature on NEW Brush Machine. Some of our problems are checked at the right.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

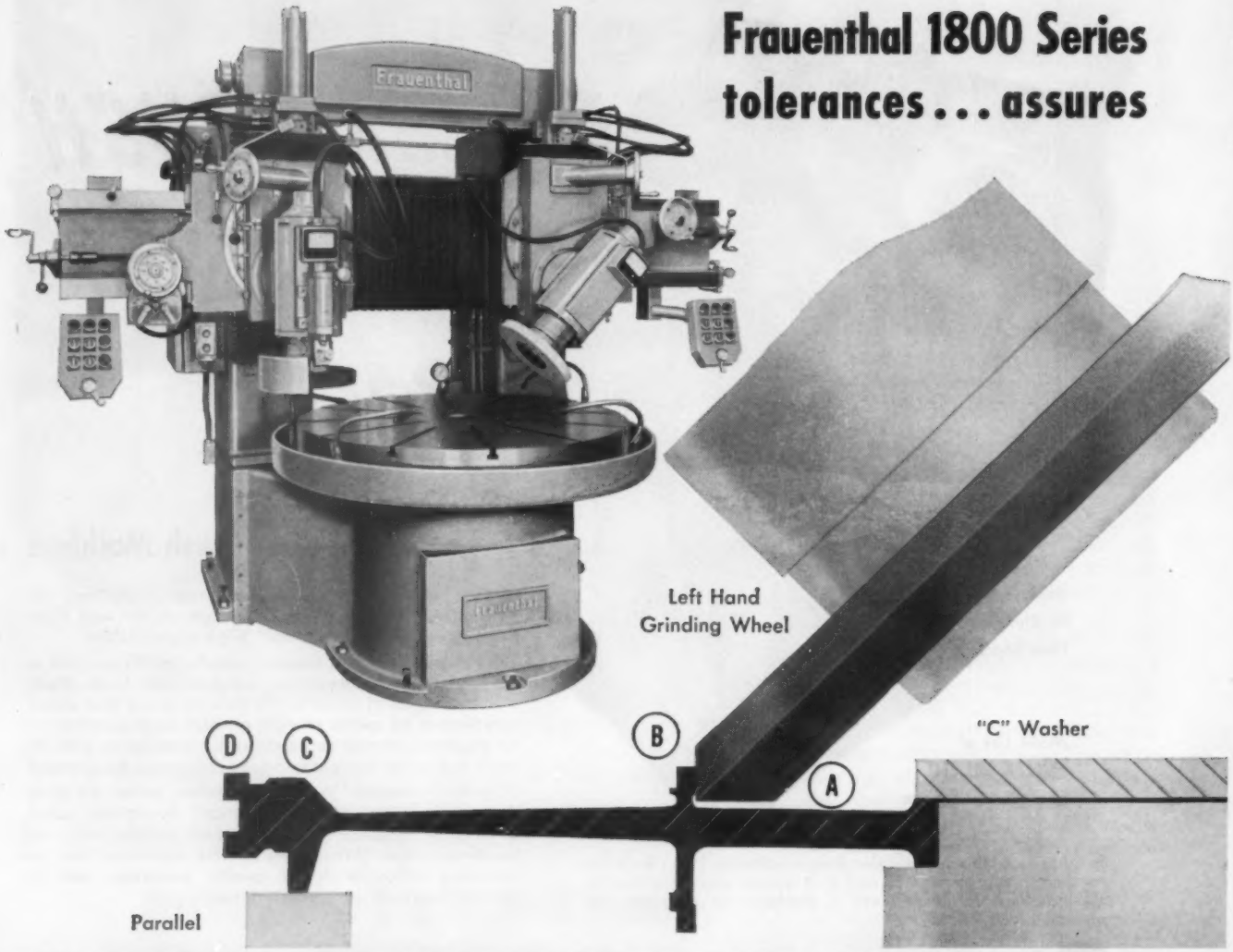
CITY_____ STATE_____

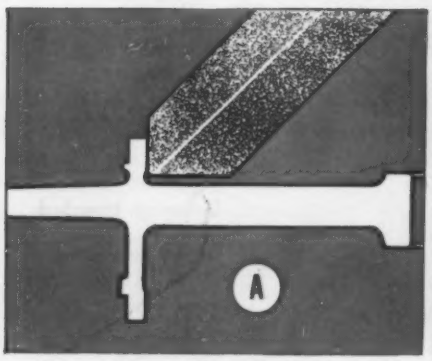
CHECK

- ____ Deburring broached parts
- ____ Deburring gear teeth
- ____ Deburring threads
- ____ Satin finish
- ____ Excess solder
- ____ Plastic flash
- ____ Blending pits and scratches
- ____ Surface uniformity
- ____ Polishing
- ____ (Other)_____

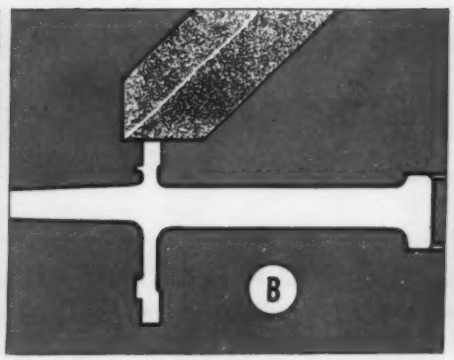
Multiple Grinding Operations

Frauenthal 1800 Series tolerances . . . assures

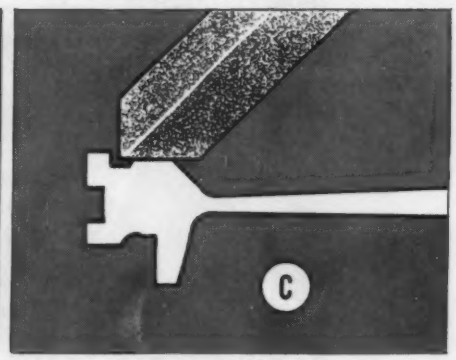




Jet engine part is set up on steel parallels and securely clamped to center pilot with large "C" washer.



Rigid mounting and proper alignment assures a high degree of accuracy in parallelism and roundness. Left hand



grinding wheel grinds one diameter and three related surfaces to extremely close tolerances.

Frauenthal Division

in One Set-Up

Double Head machine finish grinds 6 surfaces to close concentricity of related surfaces...reduces grinding costs

As ILLUSTRATED in the schematic diagrams, three different diameters and three related surfaces of a jet engine component are precision-ground square and concentric with one another in a single setup using two grinding heads. This is a typical example of how a Frauenthal 1800 Series Double Head Grinder cuts grinding costs.

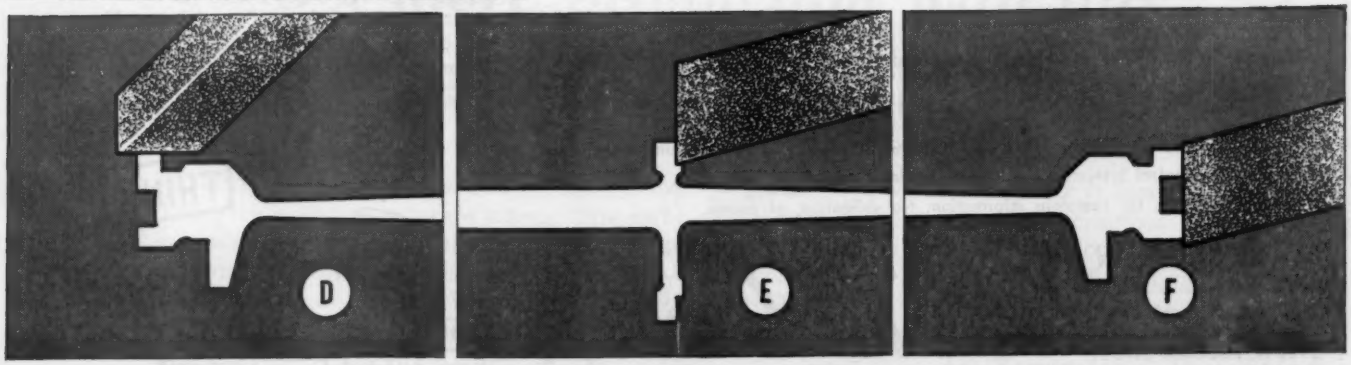
Frauenthal 1800 Series Grinders are available with four standard table sizes — 36″, 42″, 48″ and 52″ dia. with 60″ maximum swing. Specially engineered operating features or job accessories can be included to fit your requirements.

With Frauenthal Grinders (1800 Series or 2200 Series) you're able to grind a number of related surfaces (up to 140″ dia.) without changing setup of workpiece, and obtain accuracies within .000200″. This assures you *consistently* uniform precision in concentricity, parallelism and roundness.

For complete details, contact Frauenthal of Muskegon.

Free Catalog!

For complete details on Frauenthal 1800 Series Double Head Grinders, write for catalog.



Starting from center of workpiece it finish grinds INNER diameter "A", and TOP FACES "B", "C" and "D". Right hand grinding wheel finishes OUTER diameters "E" and "F". Both spindles are swiveled for accessibility to the workpiece surfaces. All surfaces of jet engine part are ground within .000200″.

THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN

McCaskey Tool Control in Winslow Mfg. Co.'s crib serving production of tools, dies, jigs, fixtures and experimental work.

WINSLOW MFG. CO. reports their McCASKEY TOOL CONTROL *a dividend-paying investment*

Mr. J. A. Price, Gen. Mgr., Winslow Manufacturing Co., Cleveland, O., highspots results of their investment in McCaskey Tool Control as follows:

"Substantial monthly dividends are earned (1) by instantly providing a dozen or more facts about tools and tooling essential to efficient and economical crib and shop operation, (2) by eliminating non-productive man and machine time that thrives on uncontrolled crib service, (3) by reducing and conserving tool purchases and (4) by minimizing crib overhead.

"Our plant and organization have grown considerably since McCaskey Control was adopted in November 1951 with an experienced, competent manager in charge of the crib. We all feel that McCaskey has proved to be a productive and profitable investment."

McCaskey Tool Crib Control . . . Gage Control . . . Blue Print Control and other Industrial Control Systems . . . will pay similar dividends in your plant, large or small. Write us for complete information. No obligation, of course.

MAIL COUPON TODAY

Victor Adding Machine Co.
McCaskey INDUSTRIAL DIVISION
3900 N. Rockwell Street
Chicago 18, Ill.

Please send me all the facts concerning McCaskey Tool Control ☐; Gage Control ☐; Blueprint Control ☐.

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Position.....
Company.....
Address.....
AM 7-55

McCaskey
INDUSTRIAL CONTROLS
TOOLS - PRODUCTION - COSTS
MAINTENANCE - INVENTORY
Victor Adding Machine Co.,
McCASKEY INDUSTRIAL DIVISION
3900 N. Rockwell Street, Chicago 18, Ill.
Galt, Ontario, Canada

the possible hundreds of dollars' loss in the several wasted shafts in question.

After long years of trying various arrangements, many firms have now adopted the following system:

A new blueprint is issued with every shop order and no print is issued without a date stamped on it. This insures:

1—as clear a print as the tracing will allow.

2—a clean print without grease spots, fly specks, tears, and occasional pencil marks.

3—a print which will carry the latest changes, whether engineering, or to suit a particular customer.

If the men are properly instructed and refuse to work unless they are certain of what they are doing, Al will be happier.

It has been assumed that the engineering department is interested in the overall efficiency of the plant and will, without too much fuss, correct tracings which do not produce legible prints. It may be, however, that engineering is stubborn and refuses relief. In that case, Al must arm himself with all the pertinent data, find other foremen in the same predicament and lay the problem on the superintendent's desk. When this worthy realizes how much it penalizes his shop, 99 times out of a 100 something will be done.

B E Renaud
Lynn, Mass

WHO IS to blame for errors made from bad prints? Who is to blame for any error? Isn't it the man on the job? Isn't it the worker who is going to produce the part? He is the artist who completes the picture. If he cannot read his print properly, then certainly he should never begin

Nuts produced by Lamson & Sessions, Cleveland, Ohio.

Get more production with this

SCRAPLESS NUT QUALITY WIRE

Youngstown Scrapless Quality Nut Wire. The wire with the accurate sizing. The right composition. The wire that measures up to chemical and metallurgical checks for analysis. Micro-examinations, too.

Scrapless Quality Nut Wire with these qualities feeds smoothly through your machines. There is less downtime. Fewer rejects. And severe die wear is lessened.

Next time you order Scrapless Quality Nut Wire, be sure you get Youngstown. It's available in a good range of compositions, including AISI Standard as well as special re-sulphurized steels. For more information, call your nearest Youngstown District Sales Office.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

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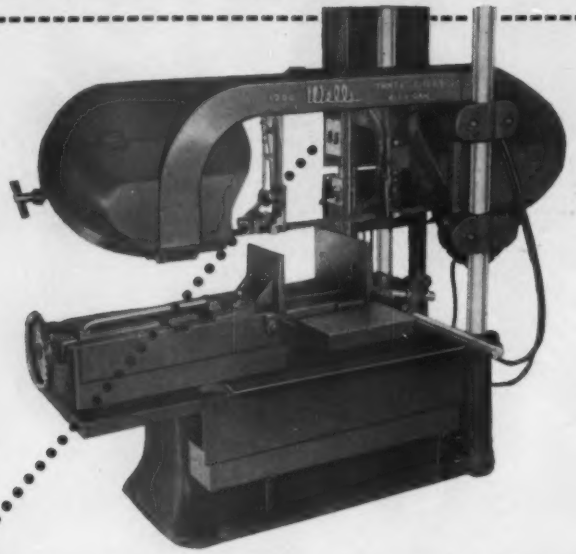
NEW EASE OF CONTROL WITH THE WELLS MODEL 1200 METAL CUTTING BAND SAW



CONVENIENT FINGER-TIP CONTROLS now operate at 110 volts

The Wells Model 1200 is a rugged, new horizontal band saw for heavy-duty production cutting in any shop. The Model 1200 incorporates all the proven advantages of the Wells No. 12, plus such outstanding advancements as "Feather Touch" Finger-Tip Control and greater safety with *110 Volts at the controls.* Metal cut-off actually becomes a preferred job with this machine because operation is so easy. In addition to ease of operation, the Model 1200 has the versatility to handle big jobs or little jobs with efficient, economical, fast and accurate action.

Flip a switch and the Model 1200 becomes a completely automatic machine with continuous operation for duplicate cutting when used with a Wells-O-Bar Feed Master stock projection unit.

Check the following select features and then request Job Engineering assistance on your specific cutting requirements.

Select Features

APPROVED ELECTRICAL SYSTEM
110 VOLTS AT CONTROLS
OVERLOAD AND LOW VOLTAGE SAFETY
NEW HYDRAULIC UNIT
AUTOMATIC CUTTING CYCLE
NEW BLADE PRESSURE CONTROLS
SPECIAL CHIP FLUSHING UNIT
NEW HEAVY-DUTY BLADE GUIDES
FOOL-PROOF BLADE TENSIONING
NEW POWERFUL COOLANT UNIT
RIGID POSITIVE STOCK STOP

DESIGN DETAILS

- Large Capacity—Rounds, 12¾"; Rectangular, 12" x 16", 11" x 18".
- For Die Blocks: Clearance bed to blade, 18". Permits 12¾" depth cut of large blocks.
- Selective Speed Range: 60, 115, 200, 300 ft. per minute.
- Ample Motor Power: 1 H.P. Blade Drive; ½ H.P. Hydraulic System.
- Parallel to bed cutting action.
- Adjustable stops for depth cutting.
- Automatic frame return and shut-off.
- Shipping Weight: Approximately 1950 lbs.

Wells SAWS

Wells

The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 Roosevelt Rd. Three Rivers, Michigan

the work. He knows he should never scale a print. Drawings are not always drawn exactly to scale, and when a print is made, reduction or printing is not always exact. This is due to paper shrinkage and other factors in print production.

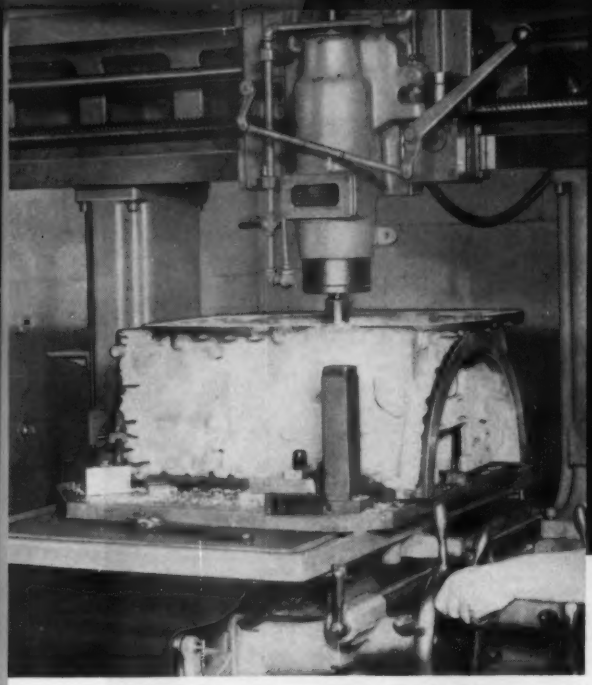
So isn't our worker at fault? Sure, we all try to find a way out when we are concerned, but is that any reason to blame the engineering department? Well, it is certainly not a good reason, but it is an out. They cannot defend themselves at this moment, so let them have it.

Strange that Mullins had trouble when Ferguson within the same department got by. If Mullins wasn't sure, how come he didn't ask Ferguson? Was it because he was willing to take a chance and gave in to guessing, figuring the blame could be passed along? Of course, people do act that way sometimes.

Certainly any shop foreman or any worker who feels that the print is bad should at least get the proper interpretation before starting a job. If the tracing is bad, and won't make good prints, then get a print properly marked up by the engineering department. Never has this request been refused if it was a necessary one. Frequently new tracings are made. If no one ever complains about prints, tracings are supposed to be all right. Your blueprint department cannot pass on readibility of prints.

Mr Foreman, it is your responsibility to see that your tools are correct to work with. Blueprints are one of your tools, so make it your business to see that they are OK. Instruct your workers to return prints to you which cannot be properly interpreted. They will depend on you to

"Mmmm, snazzy-wire wheels!!"



If limits are measured in .0001ths

chances are

Fafnir has a bearing on it

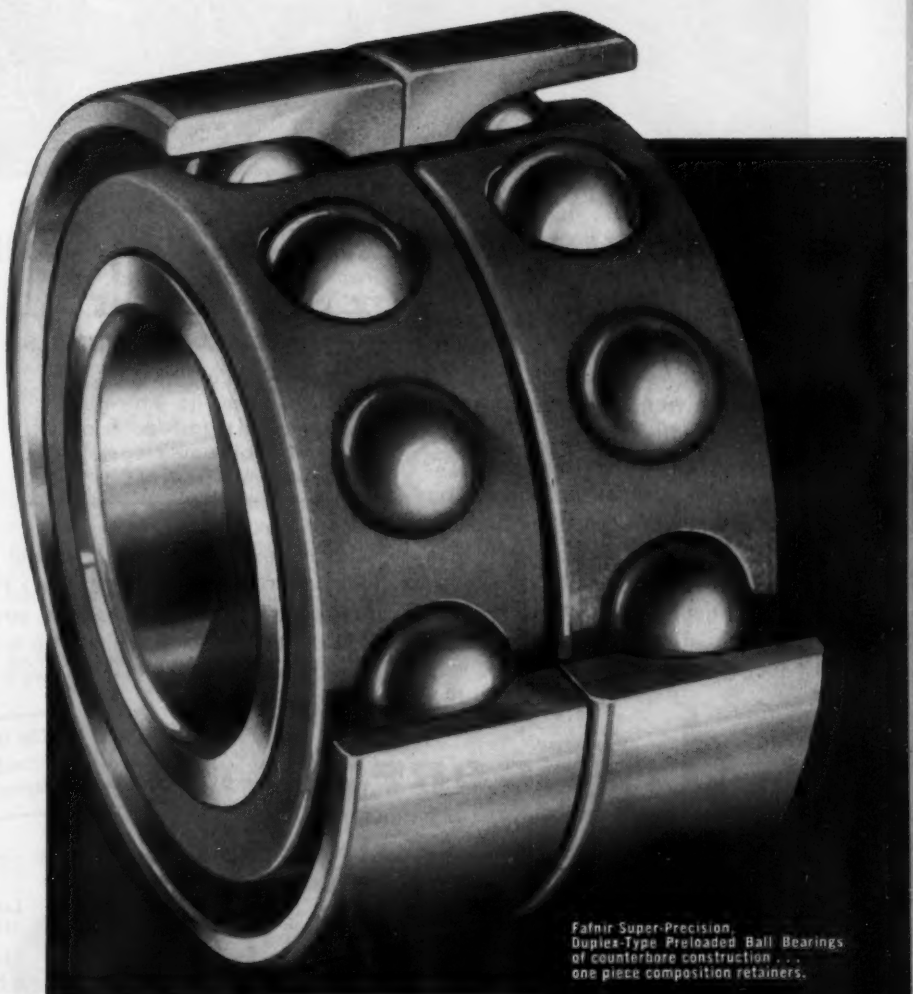
Precision designing and construction of the spindle head illustrated make possible extremely accurate profiling or milling at twelve operating speeds ranging from 260 to 6200 rpm. Design specifications include four pairs of Fafnir Super Precision Ball Bearings on the spindle shaft. These "jewels of industry" provide the ultimate in axial and radial rigidity. They run cool under exacting conditions of load and speed . . . conserve power . . . need no adjustment . . . and are permanently grease-packed.

It's in places like this where limits are in .0001ths that you find Fafnir Super-Precision Bearings . . . because they are *manufactured* in a separate super-precision department to the highest standards of dimensional control . . . in a wide range of sizes and types. There could be no better example of the "attitude and aptitude" of Fafnir engineers toward solving bearing problems.

If bearings are important to you, a few minutes spent with a Fafnir representative may help you get the right answer quickly.

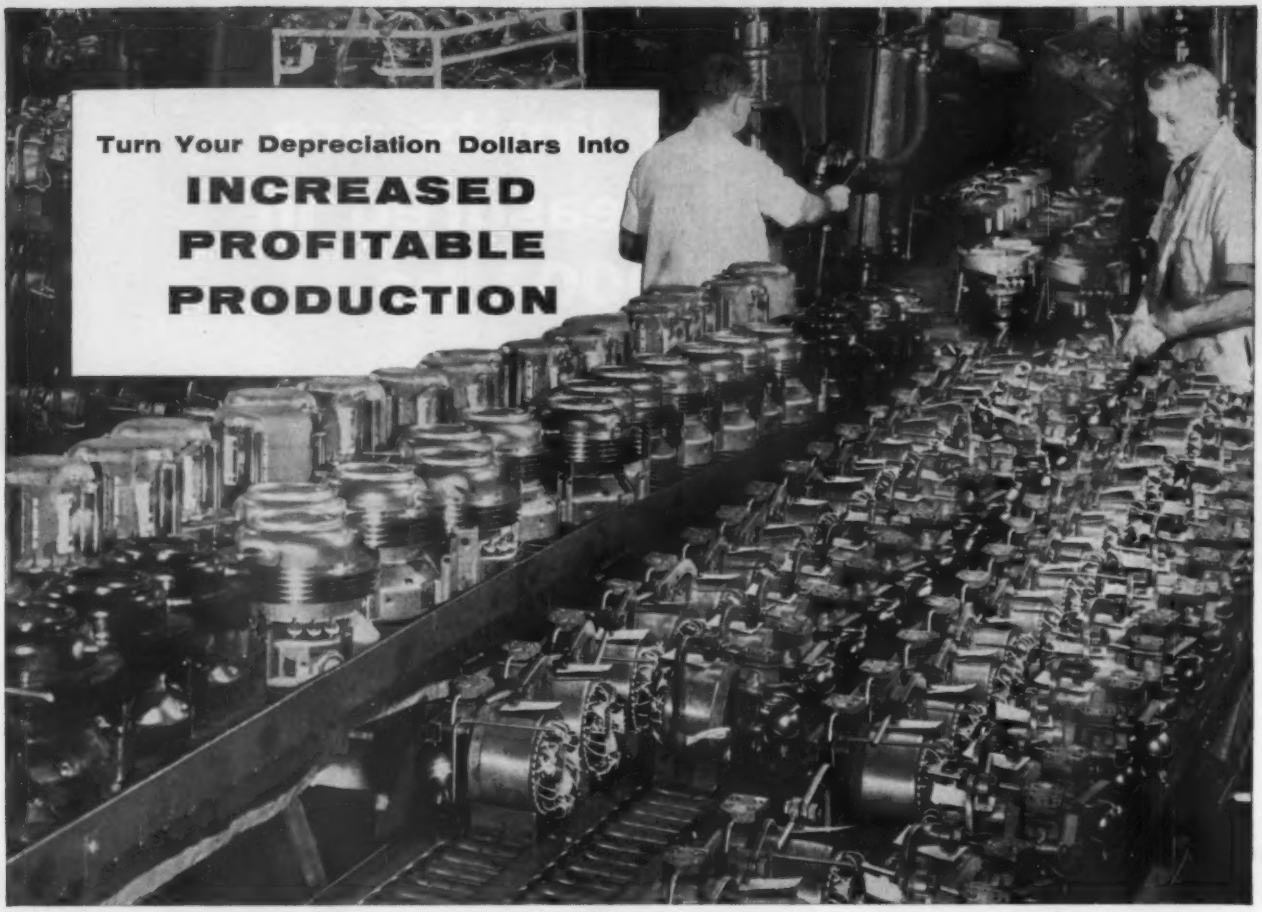
The Fafnir Bearing Company,
New Britain, Connecticut.

MOST COMPLETE LINE IN AMERICA



Fafnir Super-Precision, Duplex-Type Preloaded Ball Bearings of counterbore construction . . . one piece composition retainers.

FAFNIR BALL BEARINGS



USE THE C.I.T. PAY-AS-YOU-DEPRECIATE PLAN

New machines increase your production, cut unit costs, maintain quality, and protect your market position. Here's how you can combine all these benefits with the advantages offered by the new "fast depreciation" tax laws.

Use your depreciation dollars to buy new production facilities by financing new machines through the C.I.T. PAY-AS-YOU-DEPRECIATE PLAN. PAYD instalment payments closely approximate the depreciation allowances on your new machines. In effect, you write off the payments as expense.

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PAYD PLAN POINTS

1. Minimum use of your cash.
2. Instalment payments geared to fast depreciation write-off advantages.
3. Long terms.

Terms range from six to ten years. The PAYD PLAN charge is 4.25% for each year of the term, computed on the original unpaid balance.

New PAYD PLAN folder describes how you can put new machinery to work right away. Just write; we'll send it to you.

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get the condition changed. You, Mr Foreman, are the management team link—you can help solve our everlasting problem.

Don't take the attitude that you just exist and are not part of management. Your workers think of you as the company. What you do, or don't do, they copy because they follow your leadership. Through your efforts you can get the problems back to the proper place. Watch that personalities do not enter into the battle. Try to keep them out and matters on an even keel. Work through your supervisor and enlist his aid in correcting conditions.

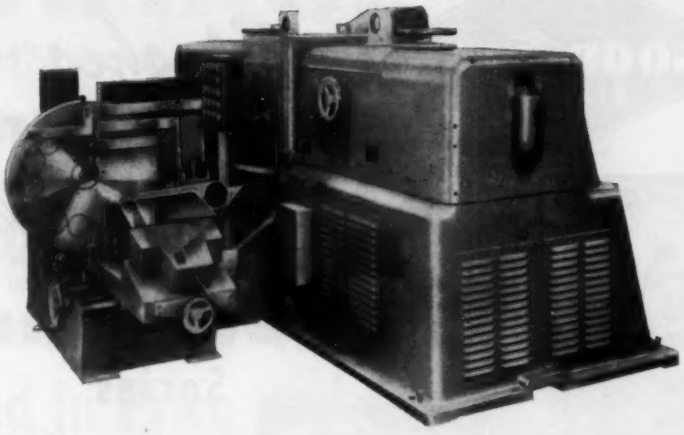
Slow, yes, but every effort in this direction is an effort to the correction solution. Don't gripe; do something about it. Perhaps you are as much to blame as the engineering department. Why don't you try a new approach this year? Try solving some of your problems instead of just talking about them to the other foremen. Get their cooperation to all work for the same ends. Then watch for results.

Charles D Townsend
West Hartford, Conn

I'M RATHER surprised that Al doesn't know who is responsible for the blueprints at his own place of work. While it's true that different shops have different organizations with different persons appointed to supply the blueprints, any foreman ought to know who this person is at his own plant.

In small machine shops having no engineering department the owner himself may be the one to blame for illegible blueprints. At very large factories there may be several offices from which blueprints are issued. Assuming the original drawings are

"Have you got an old print? I want to take a walk through the shop."



400 AUTOMOTIVE PISTON RINGS per minute are ground within .0002" tolerances on this new Besly Model 240 Double Horizontal Spindle Grinder. Electro-magnetic rotary pick-off disc at left automatically delivers piston rings in continuous flow between abrasive discs.

BESLY Announces New High Precision, High Production Grinder

Grinds parallel surfaces within .0002" at rates as high as 400 units per minute

The new model No. 240 Besly Double Horizontal Spindle Grinder was developed to meet today's increasing demands for greater accuracy and higher production. Grinding the parallel faces of piston rings is a natural job for the No. 240 Grinder. Automotive rings are being ground at the rate of 400 pieces per minute to .0002" for parallelism.

New in Design

The Model 240 is an entirely new development in the Besly line of precision grinders. New features include automatic controls which are accessible from either side of the grinder. Even dressing each disc with its own separate dresser is push-button controlled. All controls, motors, starters and hydraulic units are enclosed within the rugged machine base.

Sealed Spindle Quill Construction

The grinder is equipped with Besly exclusive Sealed Spindle Quill construction which replaces old-fashioned ways with their problems of wear and inaccuracy. Quill construction also permits smooth, accurate adjustment of the abrasive discs and avoids transmitting motor vibration to the grinding spindle.

Fast Feed

High speed feeding is achieved through a simple electromagnetic pick-off disc which supplies work to the grinder in a continuous stream. Design of the machine has cut down-time for dressing, disc changing and set-up to one third of that required by other grinders.

Will Be Shown for First Time at Booth No. 911

Described in New Bulletin. Write for free copy of Bulletin 200.

BESLY-WELLES CORPORATION

Established in 1875 as Charles H. Besly & Co.

120 DEARBORN AVENUE, BELOIT, WISCONSIN

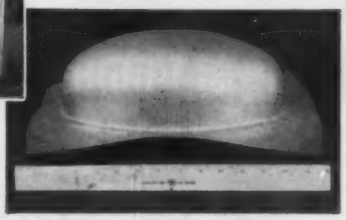
Besly Grinders and Accessories • Besly Taps, Drills, Reamers, End Mills • Besly-Titan Abrasive Wheels

GOODYEAR AIRCRAFT

Slashes TOOLING COSTS by 50 to 75% with HYSOL 6000 Series EPOXIDE RESINS

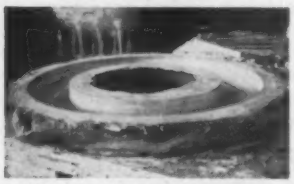
Cast spinning chuck for spinning aluminum.

.051" thick 51S type aluminum being formed on plastic die which was cast.



.051" thick stainless steel part drawn on plastic die.

Cast plastic hand-forming assembly block.



Plaster mold used for casting of plastic.

Tool being cast into plaster mold.

Material and fabrication time are the major considerations in tooling costs. Goodyear saves 50 to 75% with HYSOL 6000 Series tooling plastics! Here's how: . . . Per volume costs are cheaper than metal. Fabrication time and expense are also cut . . . tools are produced faster and with no increase in personnel or capital investment. A plastic die can be cast or laid up directly from master die models without hand barbering or fitting, requiring little skilled labor and no expensive machinery. Time is slashed, and a tool can be completed and in use within a few days. HYSOL produces more tools per dollar than any other method and eliminates large stocks of various sizes of steel and all metal waste.

Plastic tooling may solve your problems. HYSOL plastics are useful in a variety of molding, casting, laminating, and allied applications. Our research, design, and production departments are ready to serve you. Write, wire or phone.

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HYSOL

Product of HOUGHTON LABORATORIES, INC.

houghton laboratories, inc.

OLEAN, NEW YORK

made in an engineering department, it is the checker who should see to it that no drawing is so poorly made that the man in the shop cannot read the blueprints made from it. But blueprints may be unreadable even if the original drawings are good. In that case the boy or girl making poor prints should be blamed, because the printing paper may be misplaced in the printing machine, or the original drawing may be wrinkled up, which renders the prints illegible.

The design engineer cannot be blamed if the original drawings are clear, and the chief engineer should not be bothered; he has more important things to consider, and should not be held responsible for such details as the quality of blueprints.

But why didn't Al also look the blueprints over? It seems to me that he is passing the buck when he hints that Mullins' character is such that he is liable to do things like that,—even ignoring his foreman when he cannot read some figures on the drawing. I don't believe that Mullins deliberately ignored the unreadable figure of 3/16 in. and simply assumed that the dimension was 5/16 in. I think he read the figure 5/16 in. Under no conditions should Mullins be fired for this mistake; he is no more to blame than is Al or the checker in engineering. If anybody should be fired, both Al and the checker should be included.

If Al, as he says, knew in advance that Ferguson made the dimension 3/16 in. as it should be, instead of 5/16 in., he should have told Mullins about it. So it seems to me that Al is more responsible for this error than either Mullins or the checker.

To scale any blueprint in the shop should be strictly prohibited. Ferguson might as well have made scrap

(Continued on page 202)

"Rough spot on top, about half way through."

PORTAGE

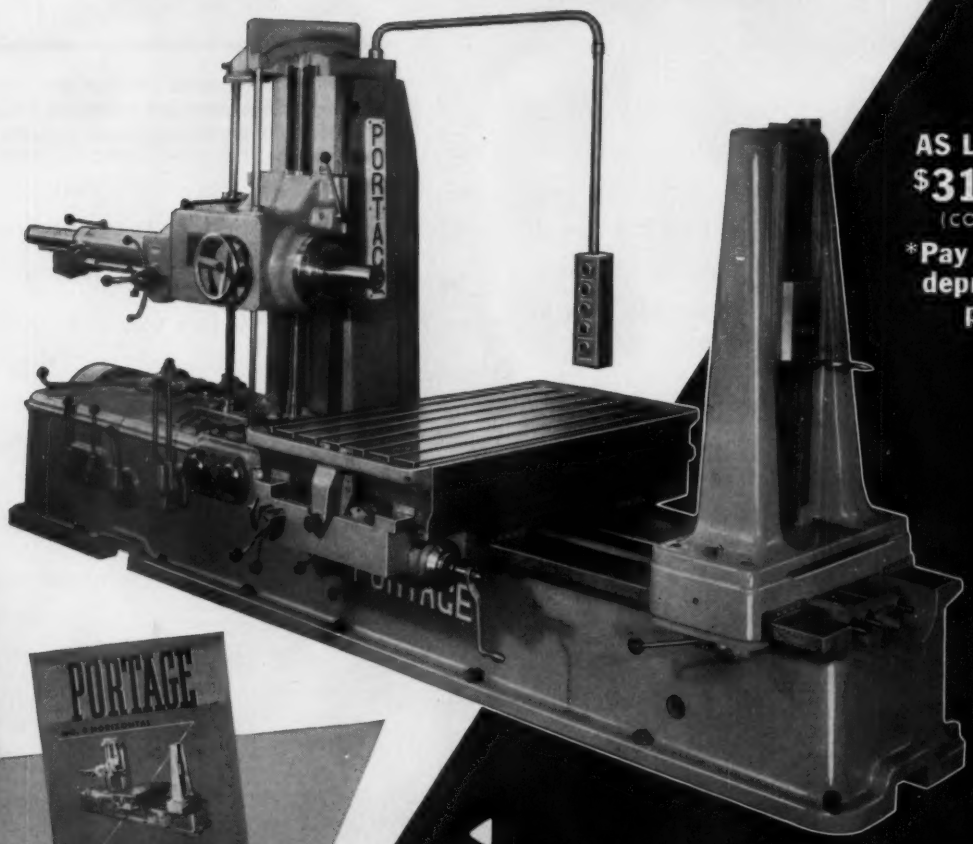
(4" Diameter Spindle)

Horizontal Boring, Drilling & Milling Machine

Outstanding . . .

MACHINE OF THE YEAR

Unsurpassed in Price and Quality



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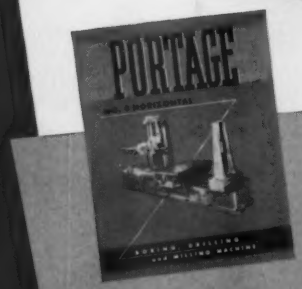

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The PORTAGE Boring, Drilling & Milling Machine offers a *real* saving in new machine investment. PORTAGE mills cost from 5% to 20% *LESS* than present comparable makes . . . and the amazing part of this savings is the machine itself . . . Write today for literature covering all the specifications and features on the PORTAGE Mill.

* For full particulars, phone the factory today!

THE PORTAGE MACHINE CO.

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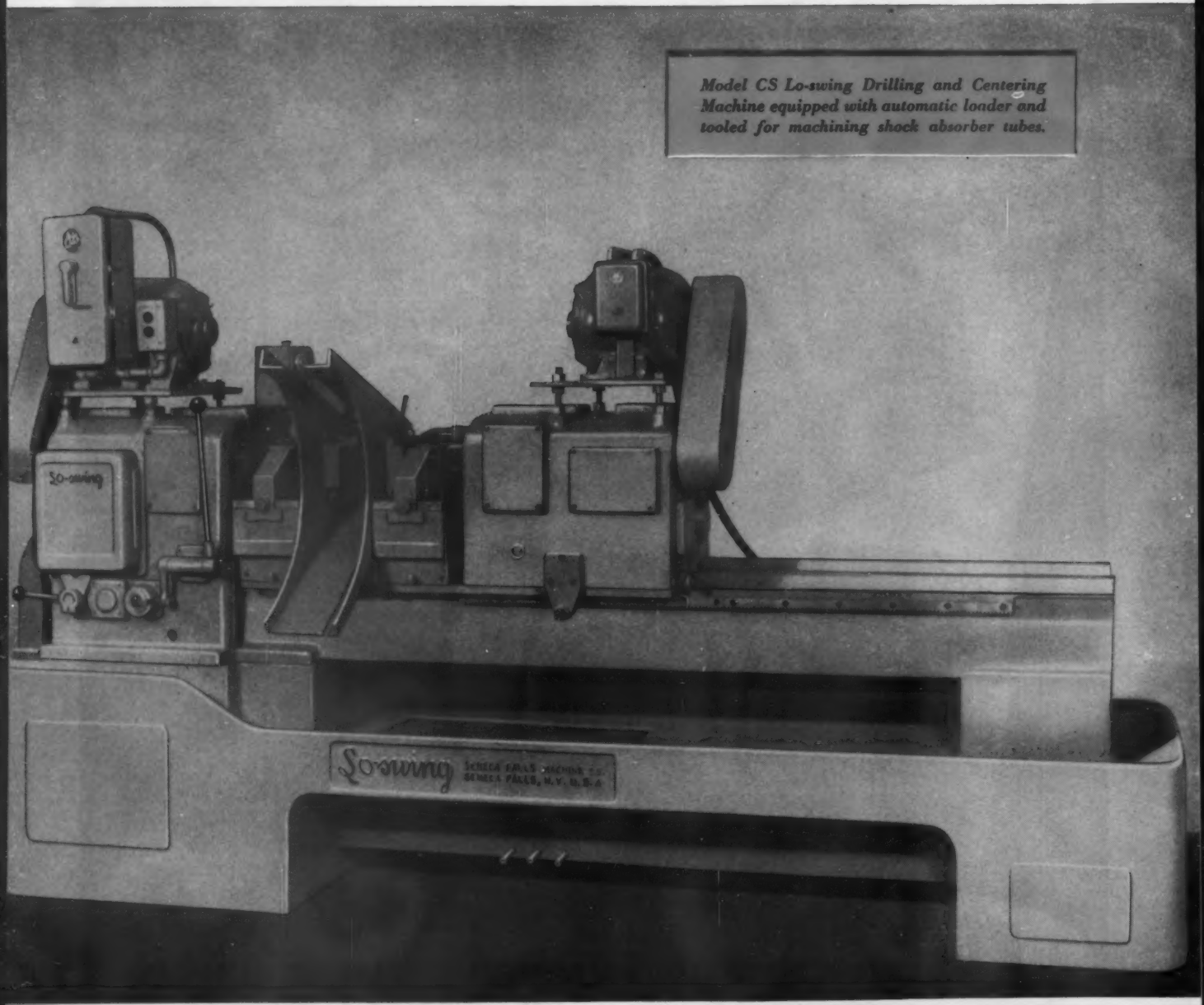
BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

MACHINE OF

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

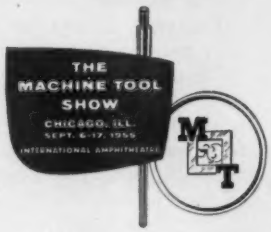
MODEL "CS" Lo-swing SPEEDS MACHINING OF SHOCK ABSORBER TUBES

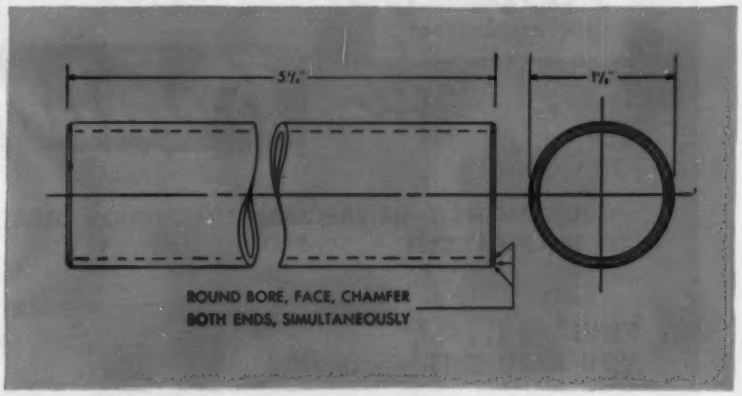


Model CS Lo-swing Drilling and Centering Machine equipped with automatic loader and tooled for machining shock absorber tubes.

PRODUCTION COSTS

THE MONTH



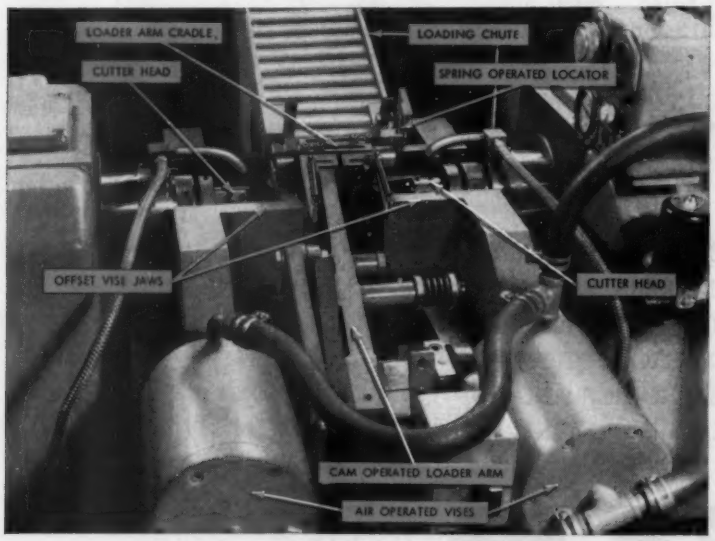


PROBLEM: To automatically load, unload and machine both ends of Hydraulic Shock Absorber Tubes at high production rate.

SOLUTION: The Model "CS" Lo-swing Automatic Drilling and Centering Machine selected for this job was equipped with an automatic loader of the type shown in the small illustration.

The tubes, which are cut 1/16" over the required length, are fed into the upper chute, shown in the large illustration, and ejected into the lower chute after being machined. Details of the loading arm, which is cam operated, are also shown in this illustration. Tubes are fed by gravity down the loading chute into the loading arm cradle where they are properly positioned lengthwise by a spring operated locator. The loading arm then lowers the tube into the air-operated vise jaws where it is securely clamped, after which the loading arm is raised to pick up the next piece.

When the loading phase of the cycle is completed, the two revolving cutter heads advance in rapid traverse and slow down into feed just before the tools reach the work. Three cutters are used in each head . . . one cutter for facing to overall length, one for rounding the bore, and one for chamfering the O. D. The machining completed, the cutter heads retract in rapid traverse and the vise jaws open, allowing the finished part to drop into the unloading chute. The complete cycle is slightly under five seconds per piece, assuring a production of 750 pieces per hour.



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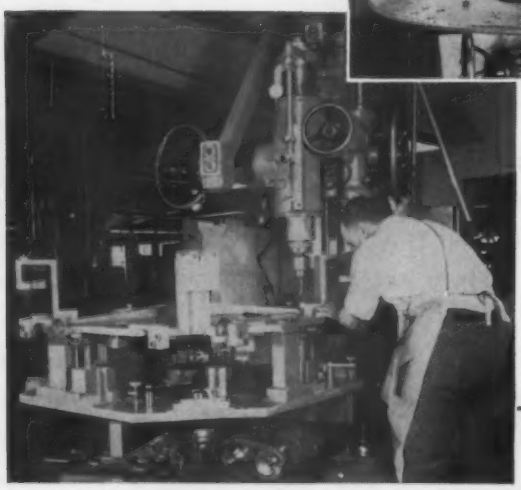

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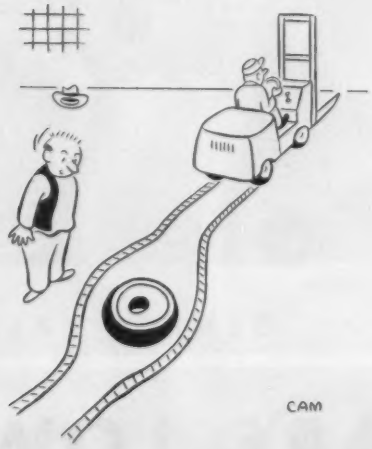
of the shafts, too. Of course, if Mullins didn't care what dimension he used, then Al has a right to scold him severely, but I have not run across anything in the story to prove that this is the case.

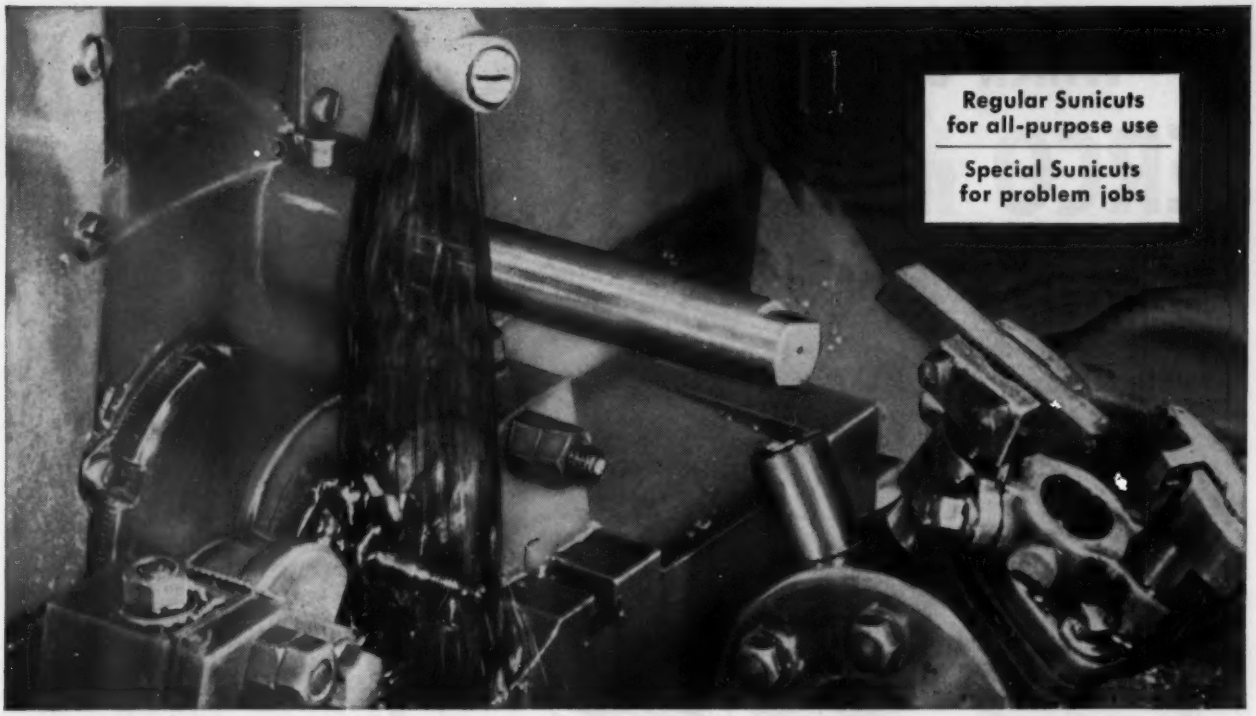
Engineering has no right to ask why there was no trouble last time these shafts were made. It is their duty to make correct and readable blueprints all the time. It is no credit to them if an error was prevented through the watchfulness of someone in the shop.

If sloppy prints are made by engineering, Al or Ed should report this to the chief engineer so that this neglect may be corrected, but this request should be made before any mistake is made in the shop. I'm sure the chief engineer will appreciate such requests and take steps to prevent them.

One of any foremen's duties is to look over the drawings, and there should always be a permanent request in the shop that any sloppy blueprints found should automatically be turned in to the foreman's office. Then mistakes like scrapped shafts cannot occur. Any illegible print should be refused by the foreman. A conference about unreadable prints is not necessary; that's only waste of time. Common sense dictates that all prints should be clear and distinct. Conferences are good when uncertain conditions must be discussed to clear up some problems or to put down rules, but that is not necessary in this case. Department heads have more important things to thrash out than to spend time on conditions already clear enough. Only if the blueprints are not improved after being reported to the chief engineer should this question be taken up at the foremen's meeting.

If the chief engineer tries to bite Al's head off when he calls his atten-





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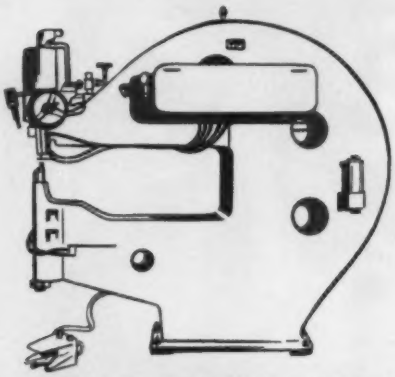

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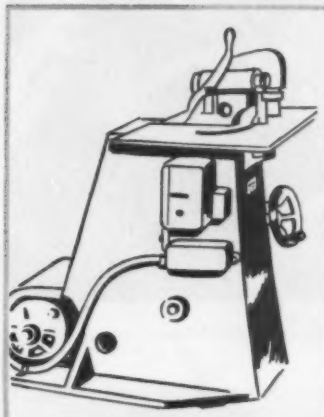

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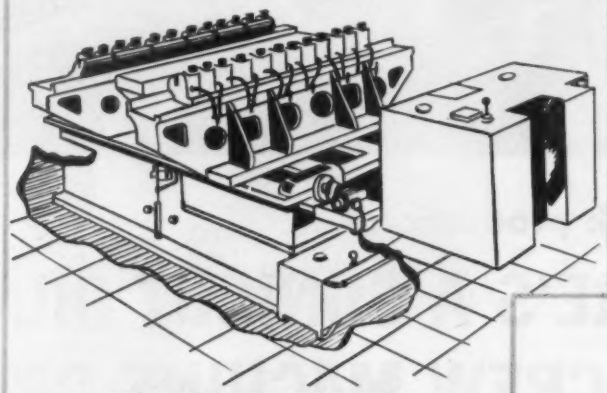

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Machine tool design and production has been an ERCO specialty since its beginning days. The machine tools shown on this page are the result of a continuing search for improvement . . . to provide industry with faster, more accurate, less costly production.

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tion to the faulty blueprints, the complaints should be made official by reporting it to the superintendent, and if this doesn't help either, the manager's attention should be called to the facts.

A E Fristedt
Stockholm-Bromma, Sweden

•

REFORMED OR DEFAMED

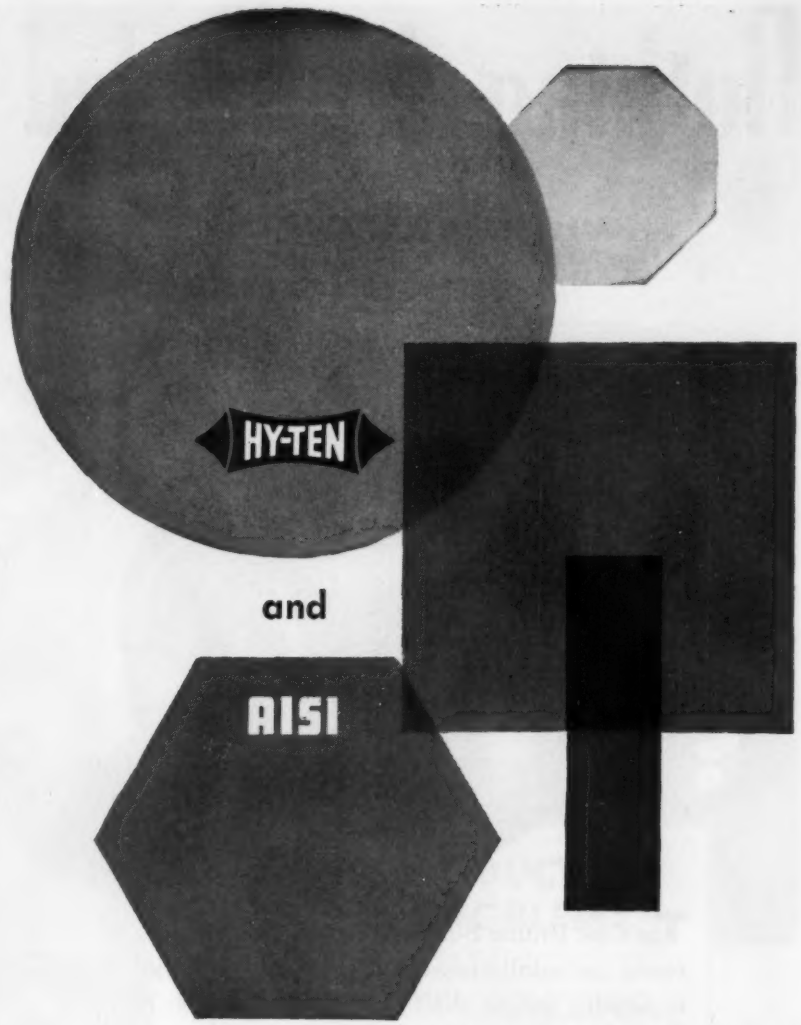
Should a man be suspect because he has served a term in prison? Is it logical for his co-workers to resent his presence, particularly if he has returned to the shop where he committed his original offence?

I DON'T THINK the toolroom men are wrong in objecting to a convicted criminal being re-started in their midst; their fear, in the circumstances, is natural and understandable.

It seems to me that Ed has good reason to be uneasy about the probable reaction of the men concerning the reinstating of a convicted man, among them. Ed's personal feeling apart, he must give heed to the men's views about whom they may be asked to work alongside. That is important and the men's indignation is a good sign, withall. If no such restriction was imposed, Ed might some day find himself bossing a collection of old lags and other nondescripts. Much better for the company and the employees to keep the party clean.

That may seem rather heartless but, from the beginning, the way of the transgressor has been hard, and if a misguided employee is prepared to lightly cast his good name aside, that is no reason why the company should follow suit. The quality of the personnel has a definite bearing on the quality of industrial relationship and also on the quality of the prod-

"Every pay day . . . Charlie goes home under convoy . . ."



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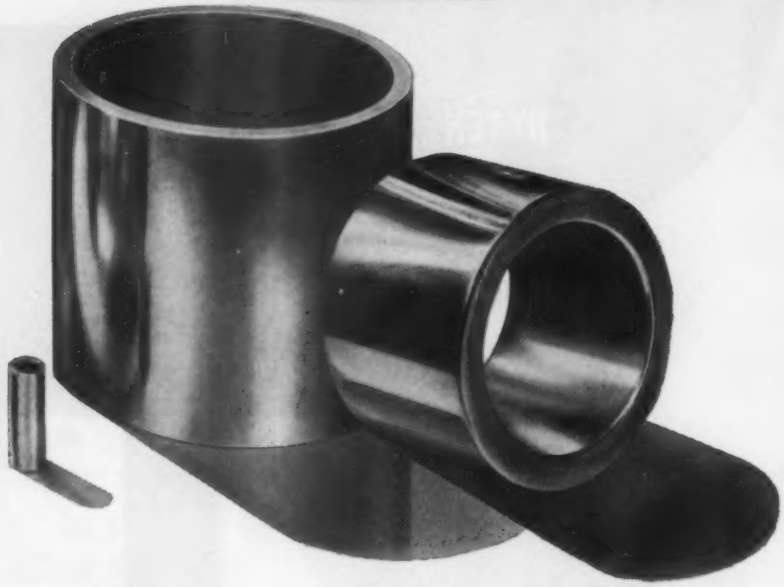

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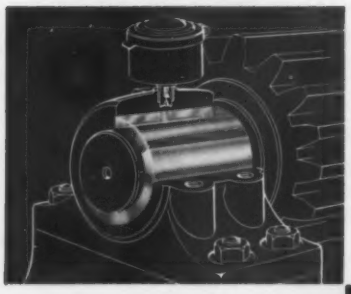

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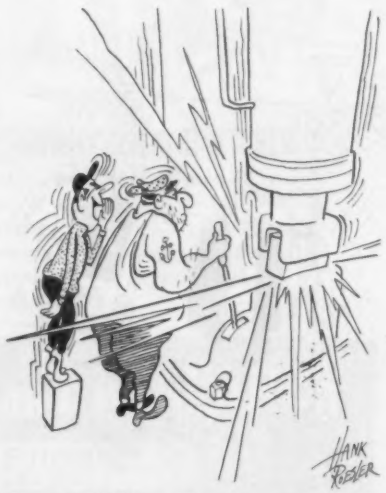
uct. Both affect the prosperity of all concerned. In the circumstances, why jeopardize so much good will for one bad egg?

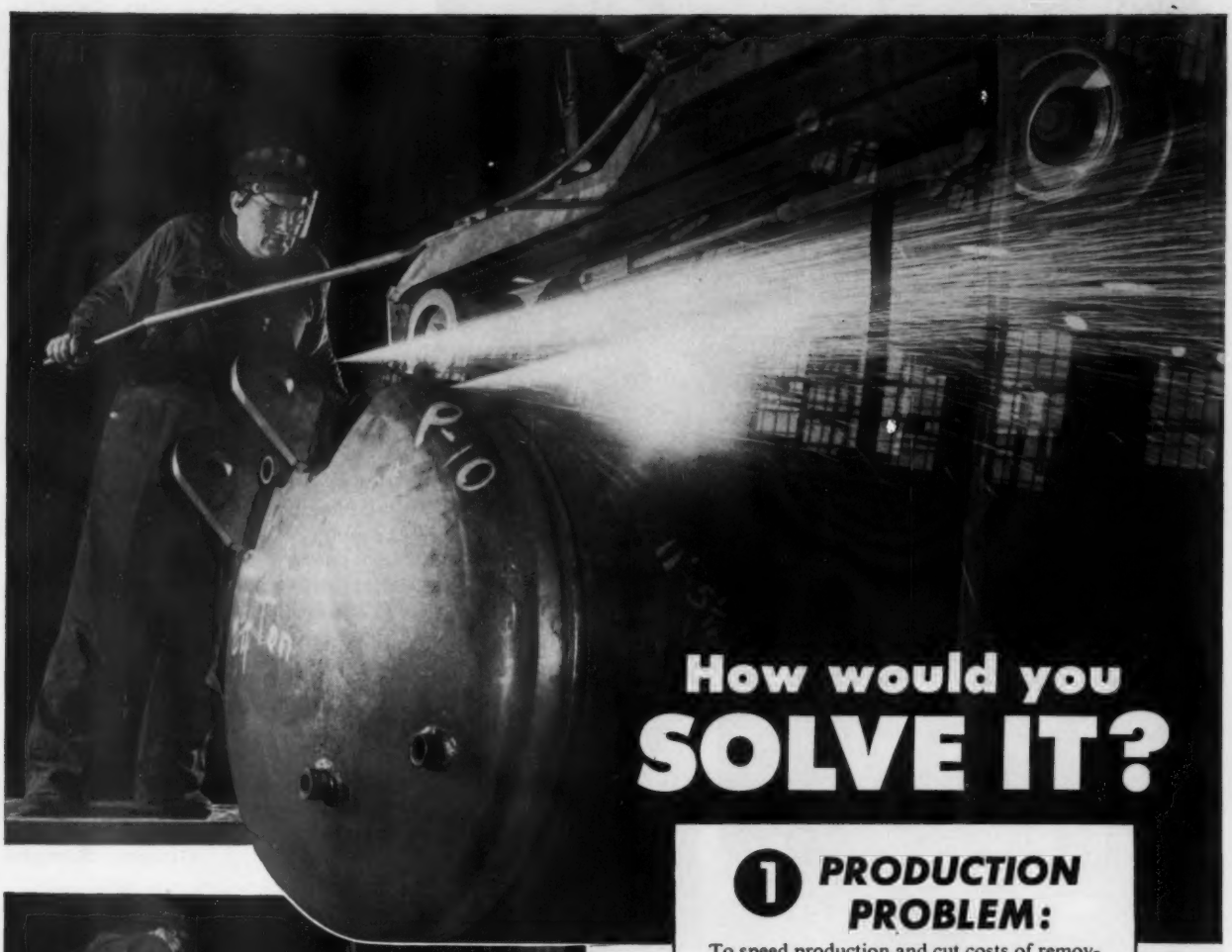
Quite recently a judge in an English criminal court was moved to remark on the amount of misplaced sympathy lavished on the wrongdoer and how little seemed to be forthcoming for the relatives of the innocent victim. He was examining a widely signed petition on behalf of a man convicted of murder, that the murderer might be saved from the scaffold. That may be regarded as an extravagant comparison, but it has much in common with our problem.

Employment agencies must furnish inquiring personnel officers with a record of each applicant and, if they have been in trouble, that, and the nature of it must be clearly stated. Had such a system been in use and functioning properly, Ed's dilemma need never have cropped up. I hold personnel responsible for the trouble. They should never have engaged the man without prior consultation with Ed. Over here, the personnel officer actually engages the labor, *ie;* he attends to all the clerical side of the transaction, etc; but only *after* the foreman concerned sanctions the engagement is the applicant offered employment.

We must assume that justice has been meted out to George Mott, the forger, since he was convicted in a court of justice. The men would seem to be looking at the matter in that light, too, and who can blame them for safeguarding their own interests? George Mott gave their feelings no consideration when he deliberately and calculatingly embarked on crime, and a serious crime, to boot. This was no sudden impulse; engrav-



". . . And I'll say it again,—you're a big, sloppy, empty-headed moron!"



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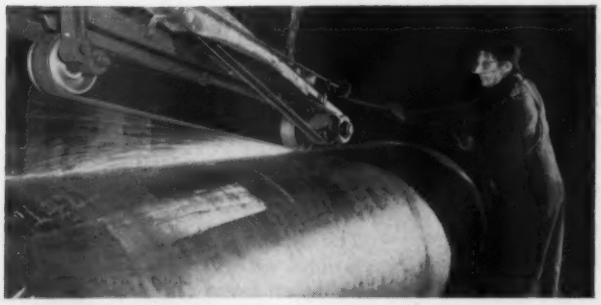

3 RESULTS: An immediate production increase with much higher quality finishes. (Note: manufacturer experimented with a "Brand X" belt, found it averaged only 3 feet of weld per belt . . . 3M belt removed 30 feet!) A 3M Representative can solve *your* grinding and finishing problems, too. Call him today . . . no cost or obligation.

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ing a set of plates with which to forge dollar bills cannot be done in a few minutes, cannot be done on the spur of the moment as can, say, shoplifting.

This naked premeditation is the bad feature, and leads me to the conclusion that Mott must have cherished and pursued his criminal designs over a long period. Such a man is not to be lightly trusted, and the mere fact that he had "brass neck" enough to ask for his job back again would seem to indicate that he has no sense of shame. I can see no sign of contrition or shame, here, and give my fullest backing to the stand the men take.

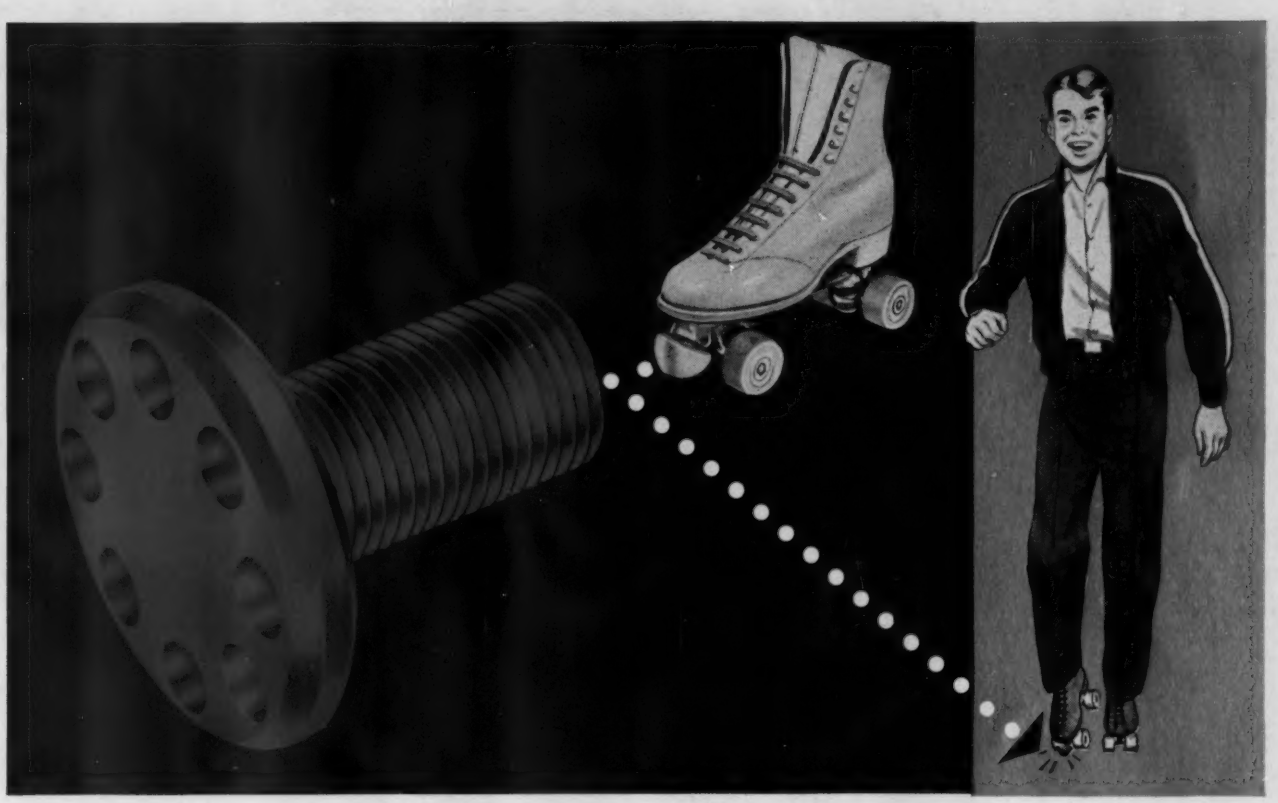
They have good grounds for apprehension and, after all, they are not demanding that the company not re-engage Mott,—they merely say they are prepared to change their jobs rather than work alongside him. That, in the circumstances, is not an unreasonable attitude to adopt. When Al says "The federal government has given him a bill of health," he would seem to imply that Mott has been cured of his criminal tendencies. I don't think that anyone can confidently pronounce criminal tendencies as cured. TB, perhaps, CT, no.

C Donald-Mackinnon
Glasgow, Scotland

FOR THE PAST twenty years I was under the impression that Al and Ed were foremen of a typical machine shop. It has sure been a letdown to find that they are a couple of teachers at a Sunday school. When they become concerned about a fellow coming to their untainted classroom who has been in prison, and mingling with the saintly scholars, my heart bleeds. What a bunch of patsys they must have been nurturing these past twenty years. When they discussed tools being stolen, boys coming to work with a half a bag on, and the boys' wives telling tales out of school, I always figured these were honest-to-goodness workers.

Now, the boys don't want to play with a kid out of reform school. The only difference between an ex-convict and some of the men in the shop is that he was unfortunate to get caught. Crime pays; getting caught doesn't.

The foremen do not have good relations with the men if they are making an issue of the hiring of a man coming out of jail. The men are using this as an excuse to rub somebody's fur the wrong way. The foremen have only to walk through the shop and put their arm around the



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REYNOLDS ALUMINUM

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rabble-rousers and give them a little pep talk and then forget the whole thing. They could give the pitch about everybody being against the man, and that this is a chance of a lifetime to the returning man, and what a great bunch of guys the men in the shop are for allowing him to get back on his feet. If they don't know how to do it, I will gladly drop around and get the boys to see it my way or fire the whole lot of them.

In my twenty-odd years around the shops I rubbed elbows with all the sinners, undesirables, forgers, alcoholics, as well as the preachers, reformers, and other do-gooders. I worked in shops where a fellow wouldn't go home alone on pay day. I worked in another shop where we started the day with a prayer. The bad men working along side of me didn't rub any of their evil on me any more than the preachers converted me to a religious fanatic.

If I were in Al's place I would let the men know, either directly or through the grapevine, that I was personally interested in giving the ex-convict an even break and wanted the boys to do the same thing. The first guy that opened his yap would be grabbed by the back of the neck and given the old heave-ho.

Frank J Zarnowski
Rutherford, NJ

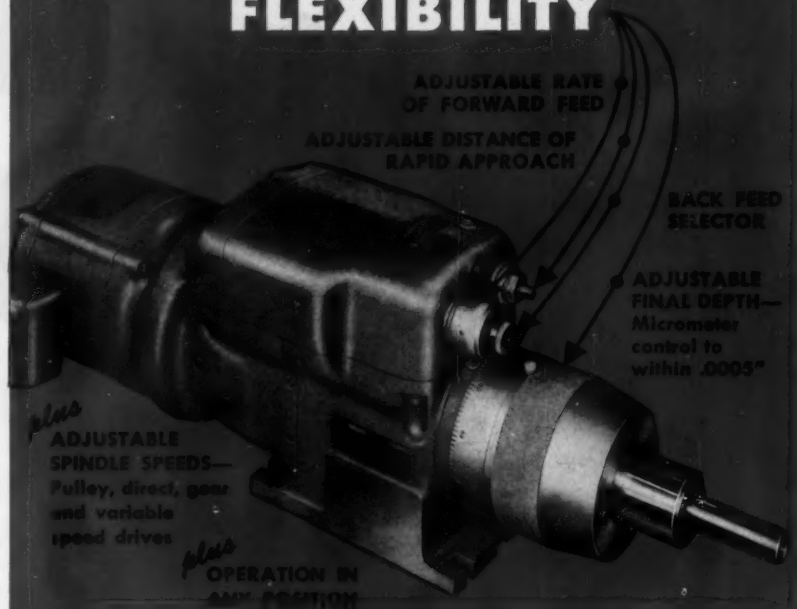
Here is my idea of how the toolroom situation should be handled by Ed, who is apparently the toolroom foreman.

The important unknown is: What kind of a guy is George Mott *now*? If he is still the same worker (morally) that he was before they put him away, Ed should know about it. If the personnel department which has rehired Mott is correct in thinking that the five years behind bars

(Continued on page 212)

"All right! Bring that back here!"

HARTFORD *Special* DRILL UNITS have POWER PACKED FLEXIBILITY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Tap	Center	Hollow Mill	Face
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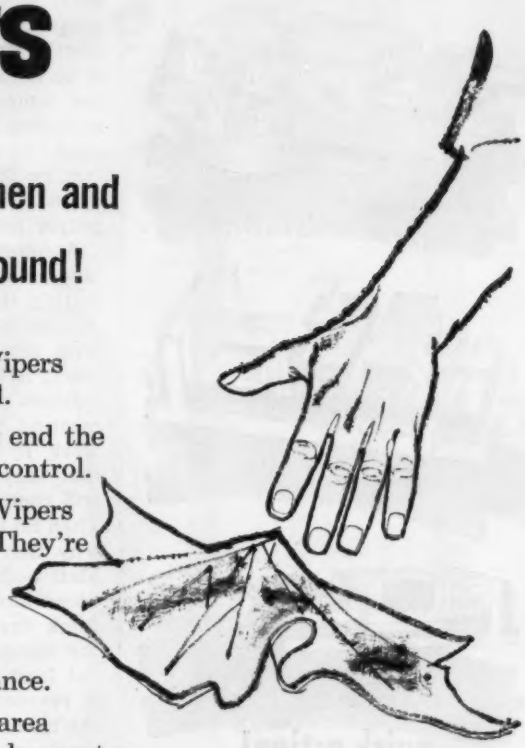

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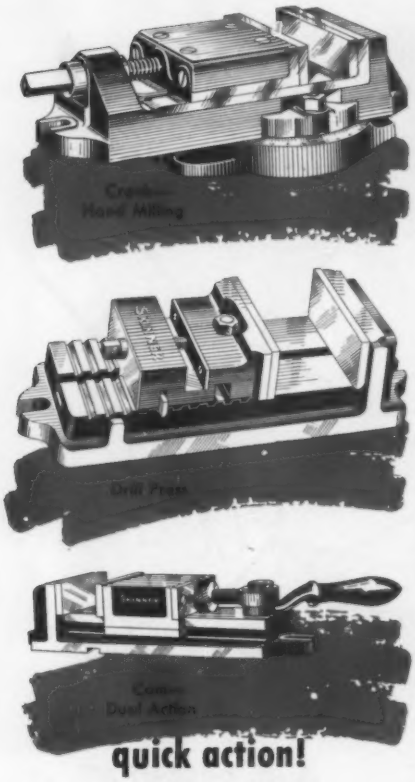

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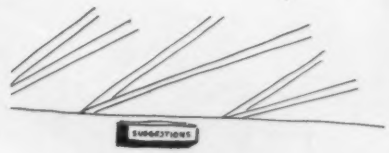
reformed him, Ed must become convinced of this before he can take any action.

So Ed must talk with George Mott (preferably off the job — in Mott's home, or in a place familiar to Mott) and try to get the low-down. He should use the indirect interview approach in an attempt to draw out Mott — to get him to talk freely and thus spill all his feelings on the subject. If Mott appears to intend to live beyond his regular income, or if he holds a serious grudge against the company or the authorities responsible for his imprisonment, he might have a relapse. If Ed suspects this, he should not accept Mott in his department, but should advise the proper personnel of this fact.

Assuming Ed thinks Mott is OK, now comes the difficult problem of getting the other toolroom boys to respect Mott and to work effectively with him. Without Mott's knowing about it Ed should call all the men together for perhaps a 30-minute meeting. Maybe they could quit work 15 minutes early one day so that they'd be using both personal *and* company time for this meeting. Then Ed should draw the men out on why they don't want to work with Mott — find out what they don't like about Mott *now* and why they don't think that Mott's ability will help the company, and thus themselves (at least indirectly). If the meeting is reasonably orderly, Ed will find the reasons for disliking Mott pretty weak, vague, and general.

While being extremely careful not to take the side of Mott or the workers, Ed should then point out that this thing (or perhaps income tax evasion, or manslaughter as a result of automobile driving negligence) could have happened to himself or



"What makes you think we aren't seriously trying to encourage suggestions?"

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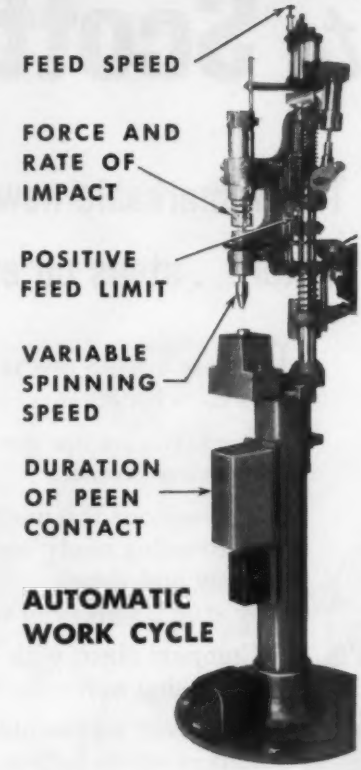

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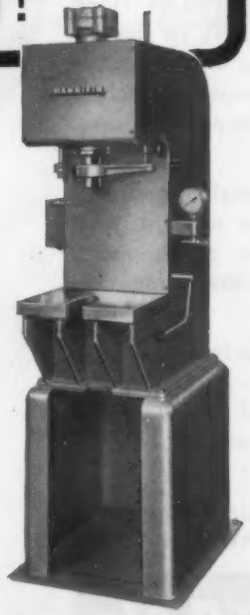

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to anyone — that a man must be given a chance to redeem himself.

If his workers then have all their complaints off their chests and seem to be pretty well calmed down, he should tell them of his meeting with Mott. He should be willing to stake his own word on the fact that Mott is going straight and has indicated his appreciation for the new job and the opportunity to work with the same bunch of men. Ed can then say that Mott is the good man they needed (for this particular job vacancy) and that his entire future is dependent upon the way the other men accept him as a co-worker.

George B Palmer, Jr
Boston, Mass

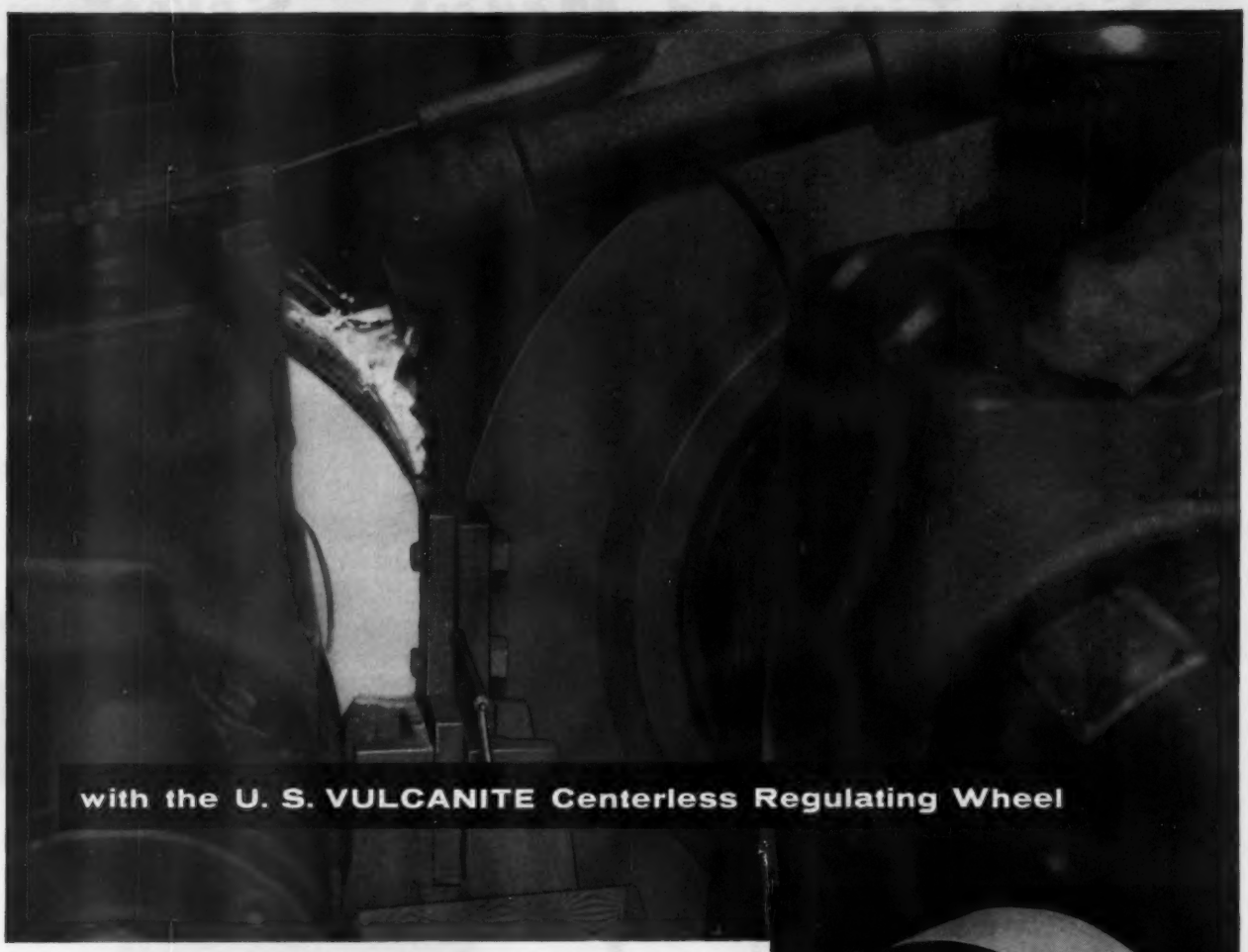
WHEN A MAN has made a mistake and spent several years in a penitentiary and is released, he is presumed to have paid his debt to society. Theoretically, he should be able to go back into society and take up where he left off—that is, if he sincerely believes that crime doesn't pay. The fact that George Mott was man enough to go back to his former employer and ask for another chance is a good test of his sincerity and I think it would be unfair to deny him a chance to make good. I would be willing to bet that ninety per cent of Ed's toolroom gang feel as I do—that is if you could get them alone and ask them.

The trouble is that some loudmouthed individual with an exaggerated idea of his own worth has gone out of his way to make trouble for Ed, the company, and last but by no means least, George Mott. I think were I in Ed's shoes I would make an effort to find the key man in the anti-Mott faction and have a showdown and find out just what was on

(Continued on page 218)

"He has back trouble—can't get off it."

NEW PRECISION...NEW SAVINGS



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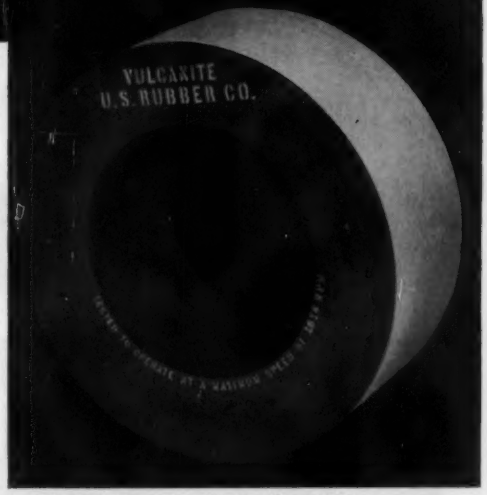

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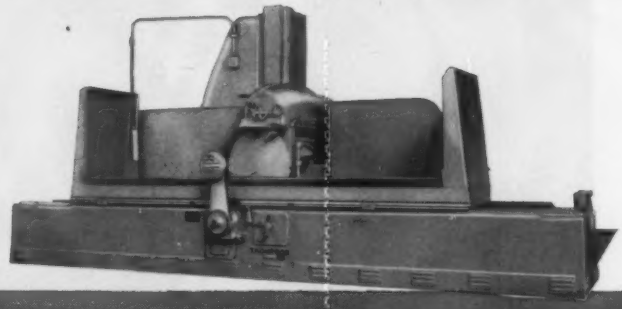

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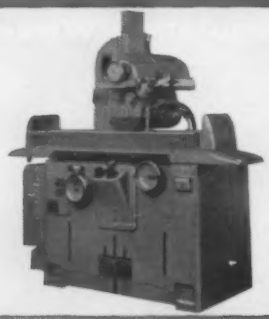
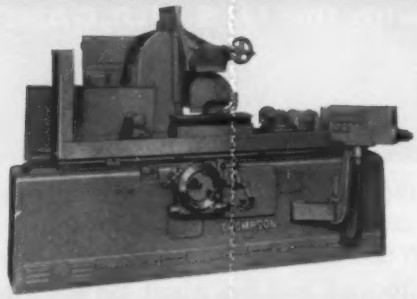


TYPE F Tool Room Grinders available in sizes 6x10x18 and 8x10x24



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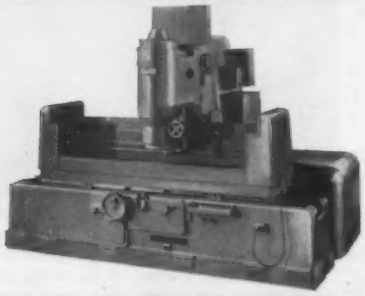

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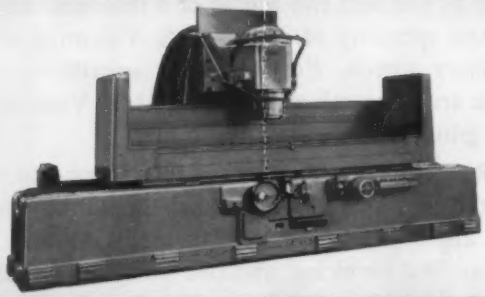

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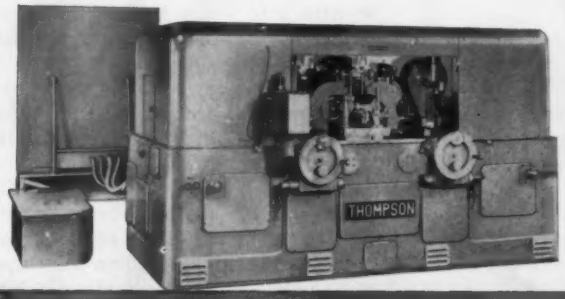

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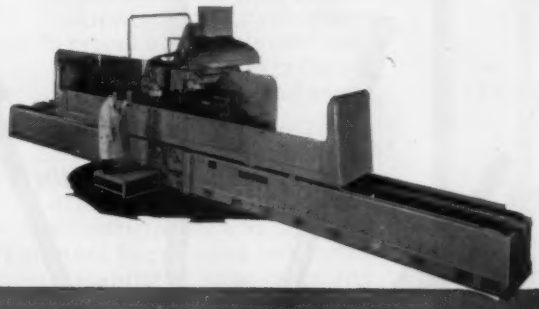

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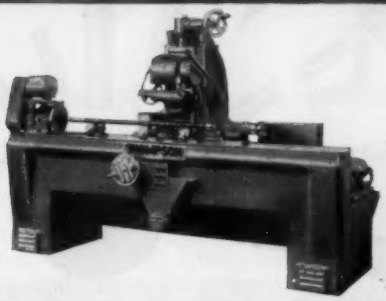

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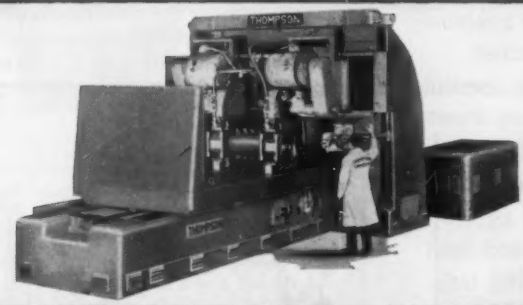

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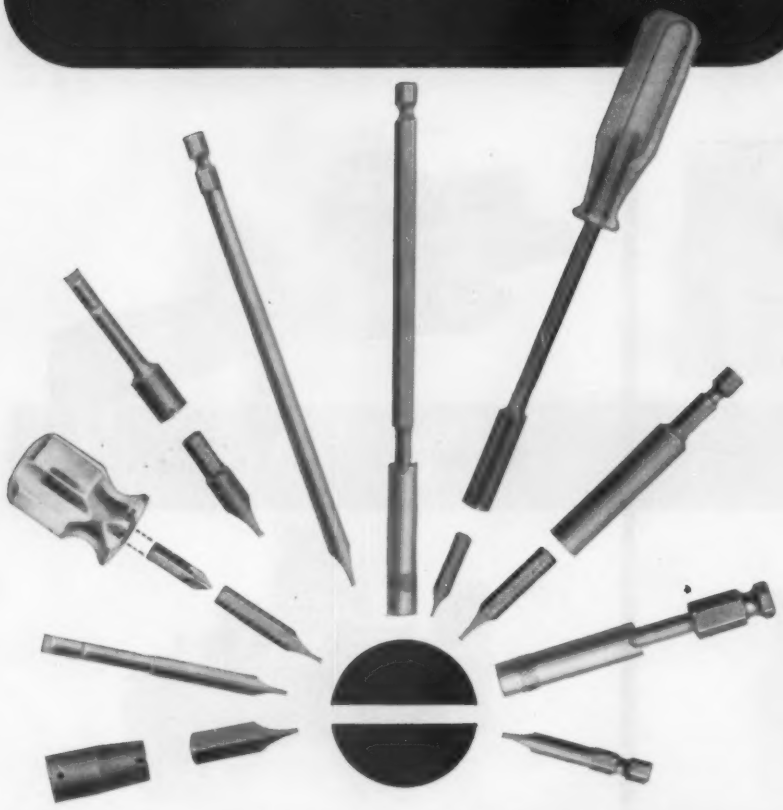

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his mind—whether he was as self-righteous as he claimed to be, or whether he was just afraid of having another good man in the shop. Sometimes a man's motives are not all that appear on the surface.

As to the statement that a bunch of grown men are afraid of one man because he spent a term in prison I would rule that out, too. Granted that the men aren't going to throw a "welcome home" party for Mott, and things may be a little strained for a while, if he shows that he is really out to do the right thing the atmosphere will melt considerably, and as the days go into months and the months into years Mott will be accepted as one of the gang and treated accordingly.

So, Ed, go along with the personnel department on this one. I think you will find that the threats to "walk out in a body" will vanish into thin air when you walk into the shop with Mott and his toolbox, because the average shopman is a pretty good type of human being when the chips are down. He particularly dislikes kicking a man when he is trying to get up.

Robert S Alexander
Glastonbury, Conn

EVERY LAST one of us makes mistakes in judgment and actions. Many of us also have been tempted to do something illegal. Fortunately for us, our mistakes are not as serious as others.

I do believe we all pay in one way or another for our mistakes. In this case the employee served his time and therefore paid his debt to society. We must keep in mind the employee has a good record outside of this one mistake. Every man deserves another chance. Every employee is worth saving. There would be less crime if the men involved had one good friend. This employee has been punished and it is not right to further sour his feelings against so-

"That picket had better get something for his hiccups."

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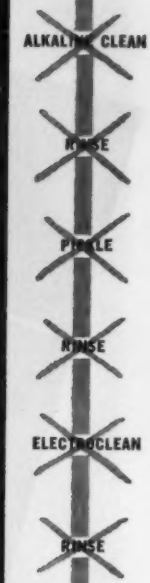

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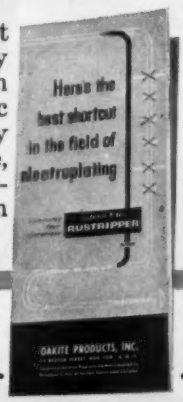

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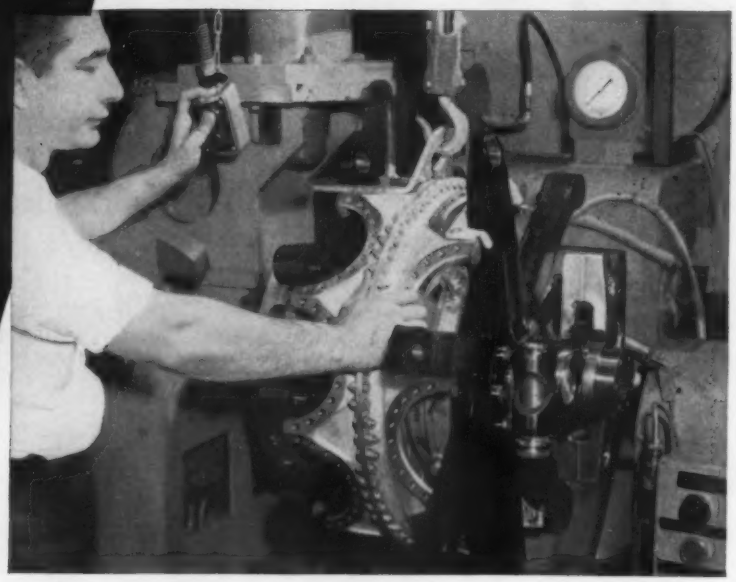

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ciety. There are always one or two employees who influence the minds of others causing upset feelings between workmen, and also between workmen and supervisors.

I believe that the best way to handle a situation like this is an appeal to the employees to use better judgment. Point out to them that the firm is taking a chance in taking the man back. Let them know you are depending on them to help him attain his rightful place in society. Tell them that in all cases of human behavior it is as much their responsibility as yours to help this man to creative thinking. I am quite sure an appeal such as this will work like magic. No good can come of further punishment, but much harm could result by resentful attitudes.

A E Salmons
Philadelphia, Pa

This man who has been to prison had made a mistake, has been punished and is now facing the problem of gaining acceptance by society. It is not a problem which concerns this man or the social workers alone; he is part of society and his problem concerns all of us. If society does not accept the former criminal to the extent that permits him to earn a living, society should not be surprised if he reverts to a life of crime. The persons who prevent him from obtaining a job should remember that if they force him to become an enemy of society they may be among his victims.

There are thousands of criminals in our society who have perpetrated crimes, both large and small, and have never been apprehended and punished. Why should the other employees fear contamination? They know that this man was a criminal, and if they feel unkindly toward him they can be on their guard. The ones they should fear are the criminals that have not been detected,

"Watch that oil that slopped out, Mac."

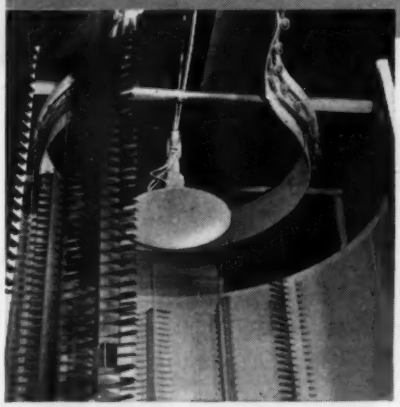
"One day we were using 14 hand sprayers ...the next day, 2

"One day we were using 180 gallons of paint ...the next day, 75

"Fantastic?" Not exactly. It's a typical, on-the-job-example of the savings made possible with the

RANSBURG NO. 2 PROCESS
Electrostatic Spray Painting

And, in this instance* production was increased; quality of the work improved, and rejections cut to practically nothing.



*Fluorescent Fixtures of California, in their modern plant in South San Francisco, uses the Ransburg No. 2 Process Reciprocating Disc Atomizer to paint their popular line of ALL-BRITE lighting fixtures. The quotes above are from Works Manager, R. H. Shaffer.

Regardless of the type of product you manufacture, if it's painted... and, if your production justifies conveyorized painting, you should look into the savings (and improved quality) which can be yours with one of the Ransburg Electrostatic Painting Processes. May we tell you about complete Ransburg services?

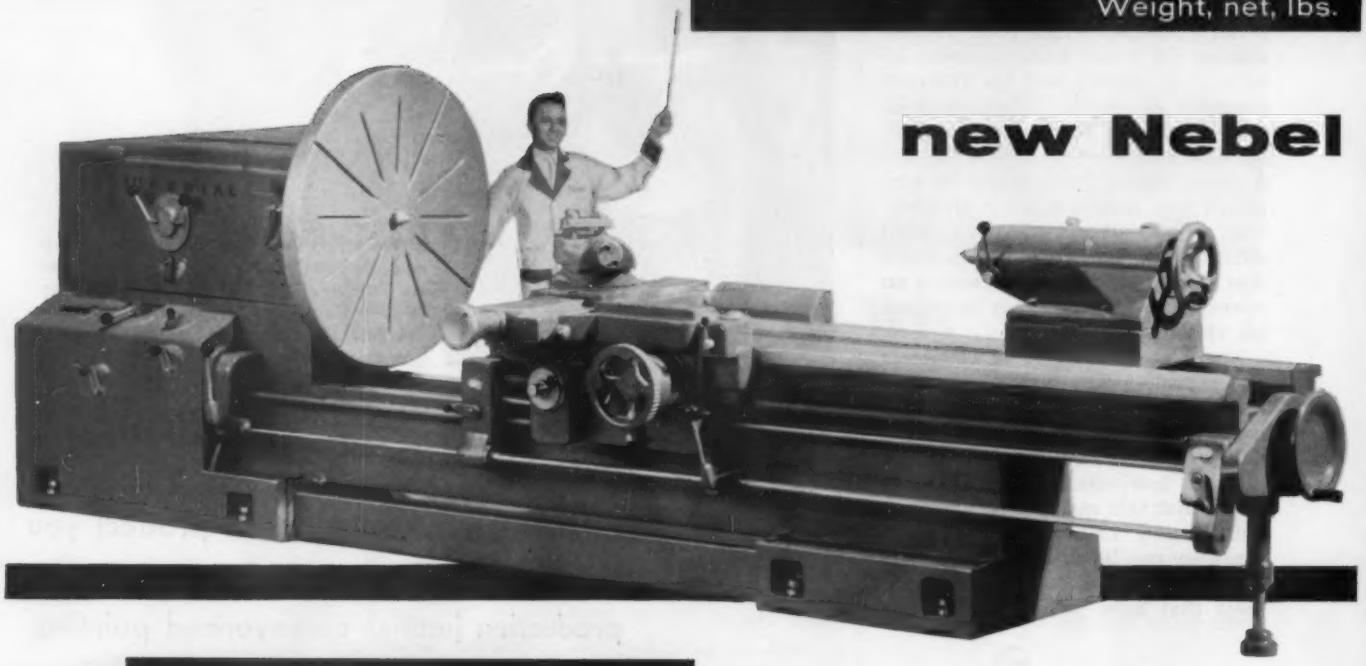
Write to Dept. AM

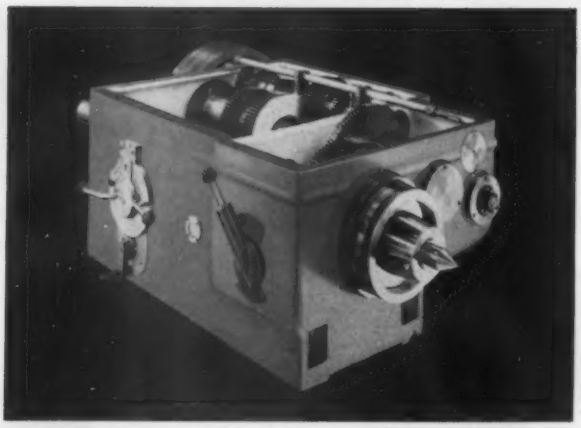
Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

Comparison proves:

new IMPERIAL has:
Swing over ways
Swing over gap
Spindle speeds, number
Spindle speeds, range, rpm
Main drive motor, hp
Weight, net, lbs.

new Nebel





IMPERIAL HEADSTOCK — powerful 18-speed dynamo of metal-cutting energy

Smartly engineered, perfectly balanced, the Imperial headstock delivers more power to the spindle. Husky shaved and hardened steel gears are mounted on short, splined shafts. All shafts run on anti-friction bearings including the 3-bearing spindle. An oil spray, automatically controlled, provides ample lubrication.

The Imperial offers 18 spindle speeds with a single speed motor, ranging from 11 to 666 rpm, or from 16 to 1000 rpm. With a 2-speed motor, 36 spindle speeds are available, ranging from 5 to 666 rpm, or from 8 to 1000 rpm.

plenty of CAPACITY - POWER - SPEED - Costs less	
Imperial	Lathe Z
24½"	20½"
42"	41¾"
18 (36 with 2-speed motor)	24
11-666	11-673
10-20	10-15
8100	8200

IMPERIAL biggest value in extension bed gap lathes

Before you buy your next extension bed gap lathe, check the new Nebel 20"/40" Imperial. Compare it with *any other* lathe of its kind. You'll find:

(1) The new Imperial costs less—several hundred dollars less — than its nearest competitor, yet has fully as much capacity, power and weight.

(2) Imperial offers a new experience in operating ease, efficiency and economy.

For complete information on the first really all new extension bed gap lathe introduced in the last 10 years, write today for descriptive free bulletin. Nebel Machine Tool Corp., Cincinnati 25, Ohio, U. S. A.

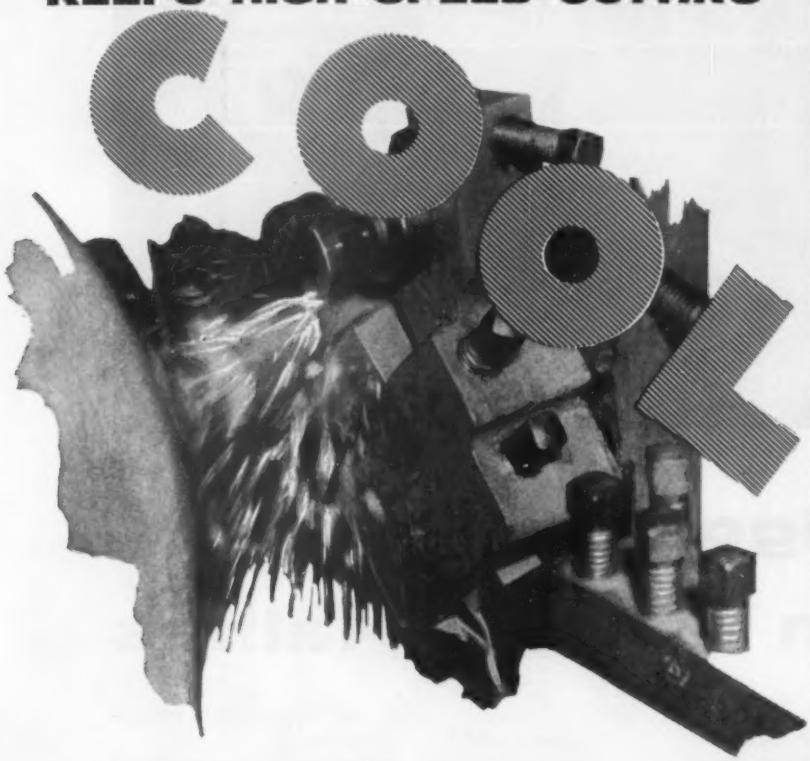
SEE THE NEW IMPERIAL AT THE SHOW!

Be sure to see the new Imperial — and other Nebel gap and engine lathes — in action in Nebel booth 511 at the Machine Tool Show, International Ampitheatre, Chicago, September 6-17.

Nebel
LATHES
3407 CATHEDRAL PARKWAY
CINCINNATI
OHIO

Improved *Lusol*

KEEPS HIGH SPEED CUTTING



If you machine the toughest metals at high production rates, particularly with carbide tools, you'll get better results with Lusol. This oil-free, chemical, transparent, metal-working solution has the highest heat-removing quality of any coolant *at the point of cutting.* Lusol's tiny droplets get right to that point, keep tools, work and chips cool. Tools last longer, finish is better, closer tolerances are possible in work pieces because uniform low temperature machining minimizes expansion and contraction. And Lusol is good to work with. It is a combination coolant, cleanser, rust preventive and water conditioner. It is non-irritating to the skin and does not cause odors or smoke. Users from coast to coast depend on Lusol — because it's BETTER FOR THE WORK AND BETTER TO WORK WITH. Write for complete information.

THE *Lusol* LINE
FOR BETTER METAL WORKING

Lusol
For tough metals, high speeds, heavy feeds. One product for both machining and grinding.

Lusol Super Concentrate
Double Strength Lusol for minimum storage and handling.

Lusol K-7
For grinding. Combines cooling and lubrication.

Lusol Shamrock
An all-around chemical emulsion.

Lusol Unikool
Universal low-cost transparent coolant.

Lusol Machine Cleaner
Cleaner and germicide.

Lusol G-3 Germicide
Kills bacteria.

Lusol Tapcool
A series of threading and tapping compounds.

THE *Lusol* LINE

. . . BETTER PRODUCTS FOR BETTER METAL WORKING

F. E. ANDERSON OIL CO., INC.
PORTLAND, CONNECTICUT

4A055A

for they have no way of knowing who they are.

We get many letters from prospective parolees, and other plants probably do also. Prisoners who come up for parole have a much better chance of being pardoned if they have a promise of a job. In order to obtain these promises the prisoners write to industrial plants and explain their problems, experiences, and abilities and ask for a job promise. These letters are stories of broken homes and broken hearts, and of the undying human hope for one more chance. We have made an effort to help rehabilitate these pardoned prisoners and to give them an opportunity to become useful productive members of society by giving jobs to a few of them.

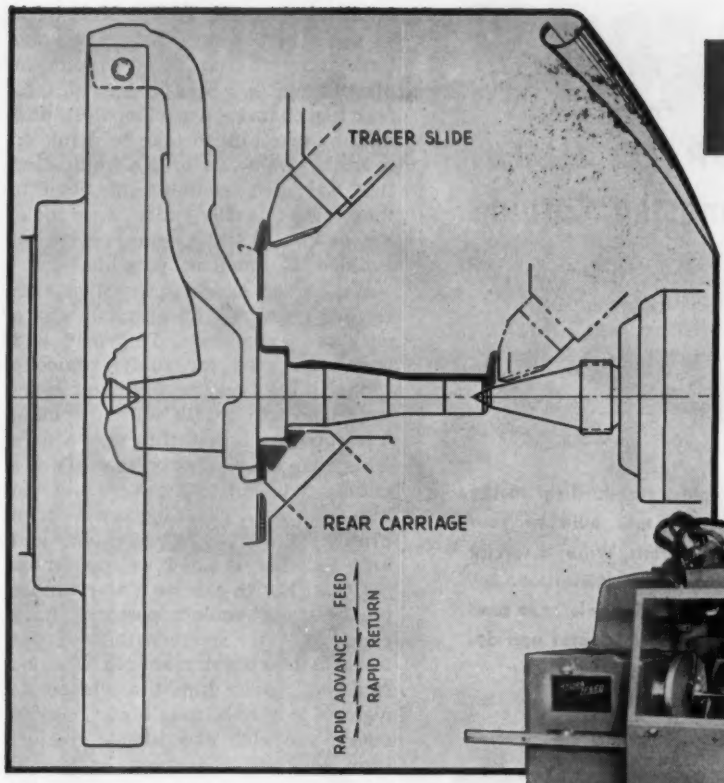
Following the decision to hire a few of them we wrote to a prison describing the positions which were open and invited the inmates who were coming up for parole to apply for these jobs by letter. The replies were screened and those from the most likely applicants were posted in the plant. The employees themselves were allowed to make the final selection by ballot. In this way the men felt that they were part of the plan to help someone who had made a mistake get a new start in life.

Henry George
Bronx, NY

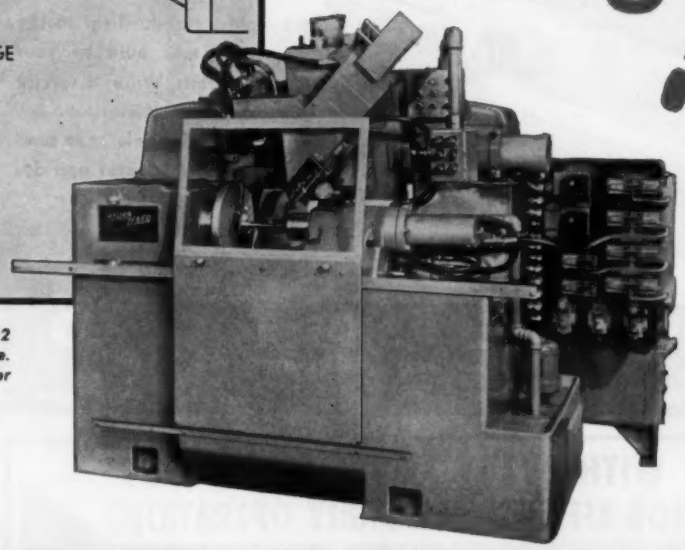
The personnel department would be wiser if they simply advised George Mott to go to some other city, where he was not known, and start his life over again. He could be permitted to use the company as a reference with the understanding that if he did so it must be with the knowledge that he had served his time for forgery and was not trying to re-

"New rule—all foremen gotta wear ties!"

Hydra-Feed Copy Turning!



It takes just 44 seconds floor-to-floor to machine this SAE 5132 steel automotive forging on the new Hydra-Feed tracer lathe. Note amount of stock removed in a single pass with tracer slide and rear carriage.



HYDRA-FEED TRACER LATHE:

1 . . . gets rid of the chip and dirt problem since tracer slide and template are located on the top carriage, well above the part being turned.

2 . . . gives you unobstructed loading and unloading—no slides or tools at the front of the machine.

3 . . . permits 2 or more operations to be performed in a single pass by using an auxiliary rear carriage for facing, grooving, chamfering, etc. Contour facing and turning are handled with auxiliary tooling, also.

4 . . . with its full width, full depth chip chute allows unobstructed chip flow even when taking the heaviest cuts. Standard automatic chip removal equipment can be added readily since a large opening is provided at rear of the machine.

5 . . . is available with either variable speed or conventional drive to suit your production requirements.

Plan to see **Hydra-Feed** copy turning for yourself in **Booth 301** at the **Machine Tool Show!**

HYDRA-FEED MACHINE TOOL CORPORATION

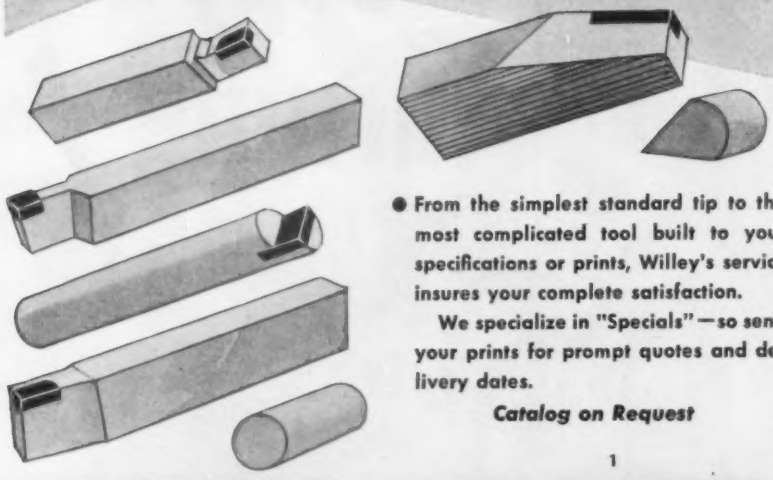
SOUTH NORWALK, CONNECTICUT AND DETROIT (Ferndale), MICHIGAN

Address all inquiries to:

SALES AND ENGINEERING OFFICE, 730 W. EIGHT MILE ROAD, FERNDALE, MICHIGAN

WILLEY'S
TUNGSTEN CARBIDE
TOOLS

EVERYTHING
from
SOUP TO NUTS
in Tungsten Carbide



● From the simplest standard tip to the most complicated tool built to your specifications or prints, Willey's service insures your complete satisfaction.

We specialize in "Specials"—so send your prints for prompt quotes and delivery dates.

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1

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

WITH EVERY ADVANCE FEATURE
FOR EFFICIENT ASSEMBLY OPERATIONS

This wide span, three motor, cab-controlled crane is ideal for assembly floor operations.
It has hoists of two capacities, is capable of rapid lateral and longitudinal travel or the precise vertical movement so essential in assembling vital parts of valuable machines.
Basically of course, it is a Euclid Crane which assures dependable and efficient performance with low cost of operation and maintenance.
Available also are: Euclid Cranes, evolved through years of experience and specifically adapted to the peculiar needs of practically every industry. *Write for new catalog available.*

Euclid Cranes

The EUCLID CRANE & HOIST Co.
1367 CHARDON ROAD
CLEVELAND 17, OHIO

habilitate himself. To put Mott back to work in a shop where everyone knew him as a criminal would, in all probability, soon cause him to feel his chances were hopeless and might cause him to take to drink or revert to crime again. He would feel that the men around him, even if they tried to act friendly, were looking down on him as someone to be avoided as much as possible.

We had an experience with a "reformed criminal" once and it was a very sad experience. This man had been convicted for theft; someone spoke in his favor to the plant manager who had a talk with the man, felt convinced that this was a case where the convict had reformed, and managed to get the man paroled in his charge. The manager then brought the man to the plant and only three of us knew he was an ex.

I talked with this man and a more pleasant, soft-spoken person I have rarely met. He spoke with gratitude towards the plant manager who, he said, had given him the chance he wanted to rehabilitate himself when every one else had turned against him. He said that now he would prove to the manager that he had become straightforward and honest, and he did a lot more talking in the same vein.

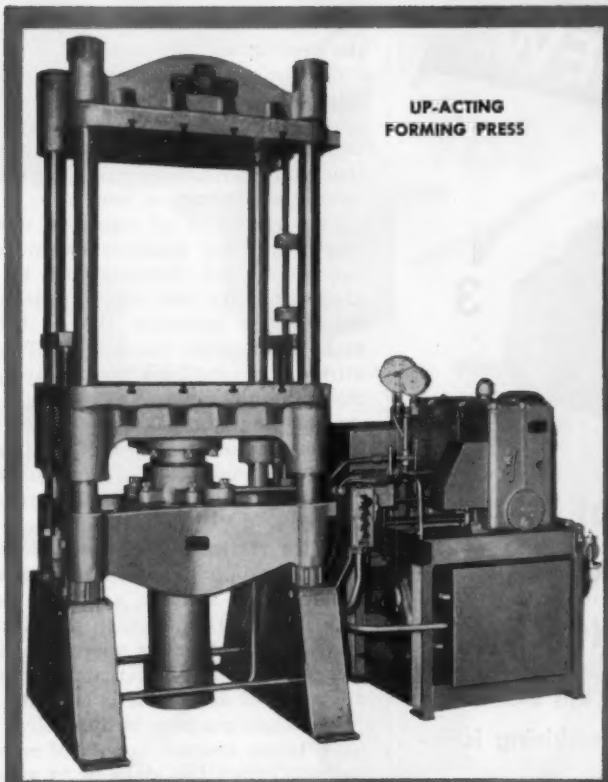
For three months everything went along fine, then the cash register in the cafeteria was robbed. After this, complaints came in very fast. Money was taken from clothes lockers, cigarette and soft drink machines were broken and robbed. Charitable collection banks on the walls disappeared, as well as expensive tools such as micrometers. Of course we had suspicions, but nothing could be done for lack of proof. Then one morning the soft-spoken, mild-mannered ex had disappeared, and I

"Joe asked me to cut a flat spot on his truck wheels so it won't roll while he's loading it."

2 BRAND NEW RODGERS PRESSES

speed metal and plastic processing

TWO NEW platen press models have just been added to the Blue Ribbon Line of industrial presses manufactured by Rodgers Hydraulic, Inc. The new presses—one an up-acting, the other down-acting—are available in a range of capacities and platen sizes. These new models, like all Rodgers Platen Presses, are designed to offer you greatest versatility and reliability at faster cycling rates. Investigate the application of these presses to your plastic and rubber molding, metal drawing and forming, veneering, and general assembly and utility applications.



UP-ACTING FORMING PRESS

This new Rodgers Hydraulic Up-acting Platen Press is designed to meet *all* requirements of your plastic, rubber or metal forming jobs.

This press has a 100-ton capacity and 30" x 30" platens —an adjustable ejector accessory unit speeds up the cycling rate. Other Rodgers accessory units adapt this press to your every need. Automatic electro-hydraulic control system governs platen pressure, movement and cycling on production runs of any length.

DRAWING PRESS WITH DIE CUSHION

New 400-ton, 48" x 36" drawing press is equipped with 70-ton die cushion, die mounting and bolster plate. Auxiliary cylinders provide fast lowering and retraction of platen—a big time saver!

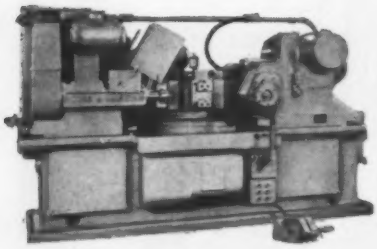
The press uses the complete Rodgers electro-hydraulic system to control platen movement, platen pressure, and time cycles for short as well as long run production jobs. You'll increase quality and boost production rates of your metal drawn products by using this new Rodgers Hydraulic Drawing Press.

IF YOU'RE PROCESSING METALS AND PLASTICS you'll be interested in these presses; let us send you more information and also a copy of our catalog describing other Rodgers "Blue Ribbon Presses" for plastic and rubber molding, metal drawing and metal forming.

HYDRAULICS Rodgers KEEPS THE WORLD MOVING

Rodgers Hydraulic Inc.

7407 WALKER STREET, MINNEAPOLIS 16, MINN.



GOSS *and* DE LEEUW CHUCKING MACHINE

When any of the various functions for which this machine is designed are performed on it, no further machining is required. The job is finished.

The basic "1-2-3" method—exclusive with Goss & DeLeeuw—provides for gripping work in the chuck and machining all ends either simultaneously or in sequence. By eliminating several handlings and set-ups, the "1-2-3" method produces finished pieces at a fraction of the time and cost ordinarily required.

Send samples of your work for time estimates. Ask for illustrated literature containing detailed information.

GOSS & DeLEEUW
QUALITY PRODUCT-QUANTITY

GOSS *and* DE LEEUW
MACHINE COMPANY, *KENSINGTON, CONN., U.S.A.*

have never seen or heard of him since. By a remarkable coincidence that day ended the petty theft wave; things have been normal ever since.

George P Pearce
Albuquerque, NM

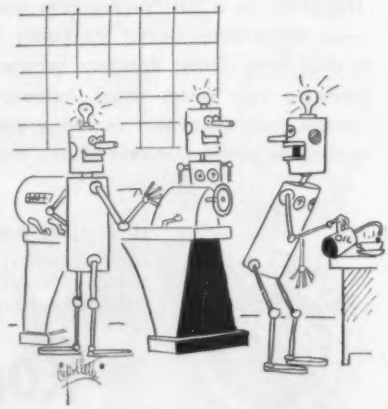
An ex-con, eh? Well that isn't so bad, for many times a man of this caliber is not always and forever crooked. Later in life he is very apt to go straight, for he has learned his lesson the hard way and probably will not forget it. We must consider one element of time, for the value of a good man is not what he has done in the past but what he can and will do in the present and the future.

Ed's men should consider their jobs as a part of their business, financed by their employers, with a well considered stipend to them even though, perhaps, their employer may be obliged to take a loss.

This applies to all classes of men, whether in big business or one of our stable and reliable men in a plant, and Ed's men should consider the matter seriously before they make their kicks about Mott. Their attitudes belong back in the days of the whipping post, the stocks, and the ducking stool, but certainly not in these times of modern dealings when everybody has a fair chance unless he gets up against a crowd like Ed's.

Police statistics indicate that out of every group of twelve men, there is one crook at least, so, if Ed has fifty men working under his direction, he has four or more crooks. Hence, when Al says that they are no bunch of angels, he is correct.

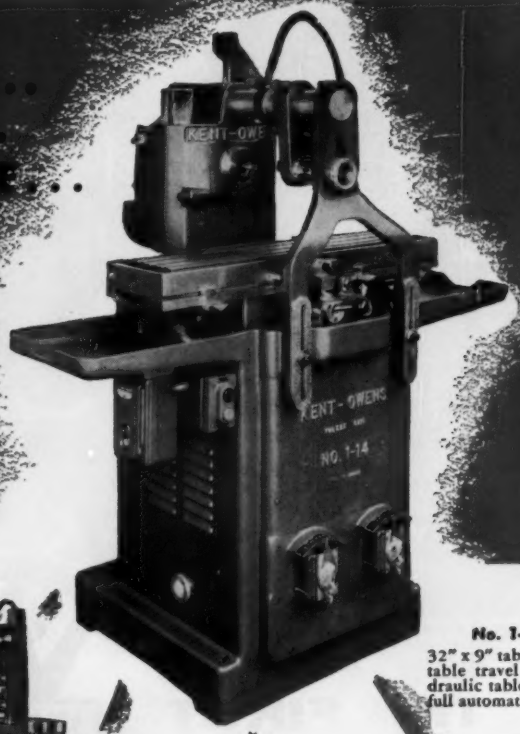
Perhaps some men in the toolroom have taken home a couple of small bolts to repair the stove or to mend a chair leg. Are their acts considered to be crooked? Usually not, but they are grouchy about Mott. In a small way, they are equally bad, even



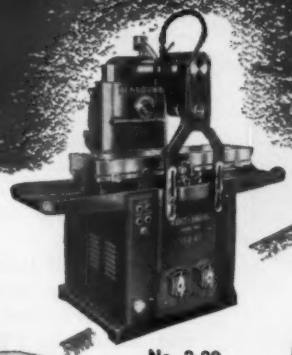
"OK, you guys; break it up! It's time for an oil break!"

EXTRA RUGGED... SPEEDY... ACCURATE...

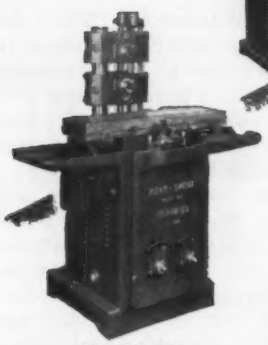
to Bring Down Milling Costs!



No. 1-14
32" x 9" table ... 14" table travel ... hydraulic table feed ... full automatic cycle.

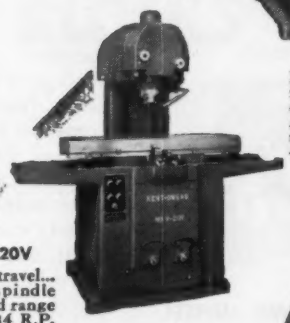


No. 2-20
20" table travel... 42" x 12" table.. fully automatic hydraulic table feed.

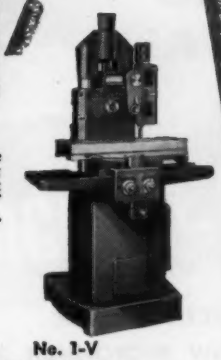


No. 1-14DS
Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.

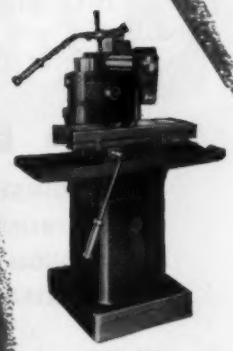
No. 2-20DS
Double Spindle for two milling operations at same time... 20" table travel ... 42" x 12" table.



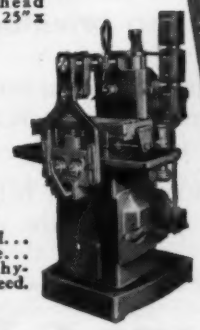
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.



No. 1-V
Hydraulic vertical head feed ... 5¼" head travel ... 25" x 9" table.



No. 1-M
Hand feed to table and head ...25" x 9" table ... Adjustable head counterbalance.



No. 1-8
8" table travel... 25" x 9" table... automatic hydraulic tablefeed.

STEP UP SPEED and ACCURACY!

Put the work on Kent-Owens Machines for top-speed milling and topmost accuracy to keep your costs at a minimum! Advanced features throughout these rugged machines make the difference . . . greater dependability . . . accuracy maintained in meeting tough production schedules. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to spindle. Write for bulletin #754 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, O.

KENT-OWENS
for milling machines

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though these acts are committed every day. Let them have a little bit of Christianity, for this will be to their credit and they will be better men among men.

There is no use in pussyfooting to characters like Ed's men. A good cure would be to have their heads parboiled, or to be pushed over Niagara Falls in a barrel.

F H Stebbins
Worcester, NY

New Books...

PLASTIC TOOLING—*By Malcolm W Riley, associate editor, Materials & Methods. Published by Reinhold Publishing Corp, 430 Park Ave, New York 22, NY. 120 pages. Size 5x7 in. Price $2.50.*

This is one of Reinhold's "Pilot" series, which is intended to cover in small, short books, new processes and materials. Plastic tooling is a fairly new subject, and it is covered in this book in an easily read, concise, but fairly complete manner.

The book covers advantages, disadvantages, reason for being, materials, fabricating the tools, fixtures, forming tools, dies, experimental tools, and future outlook. You could easily read it all in an evening and come out with a good general knowledge of what's being done in plastic tooling, and what may be done in your plant. You won't have a detailed, chemist's knowledge of the field; but if you were a chemist, you'd probably already know enough about the field and wouldn't be interested in this book.

There is some basic data included in the book—for example, properties of some plastics, curing temperatures for molds, and such. This is important information if you are evaluating plastic tooling for use in your own plant.

•

HELICAL SPRING TABLES (FIRST EDITION)—*By John D Gayer and Paul H Stone, Jr. Published by the Industrial Press, 93 Worth St, New York 13, NY. 165 pages Price $5.*

This 4-section book is an index of over 6800 ready-designed compression and tension springs. Two sections give tables of compression springs with coil diameters from ⅛ to 4 in., and tension springs with coil diameters from ⅛ to 2 in. For

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W & B E-1 is just one of a complete line of metalworking lubricants made by White & Bagley Co., specialists in the field for 67 years!

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each spring size, information is tabulated under maximum load for corresponding free length, maximum deflection, length at maximum load, wire dia, number of active turns and spring rate in lb/in. Calculations are based on a service life of 20,000 cycles for full-range deflections of spring-steel wire having a torsional modulus of elasticity of 11,500,000 psi. Conversion factors are supplied for use if the designer wishes to choose another service life, stress or spring material.

•

FORMING OF AUSTENITIC CHROMIUM-NICKEL STAINLESS STEELS. (SECOND EDITION)—*Published by the Direct Mail Circulation Section, the International Nickel Co, 67 Wall St, New York 5, NY. 394 pages, 8½ x 11 in. Price, $5.*

Excellent industry response to the first edition of this book, published in 1947, plus a waiting list of people who could not get copies, prompted the International Nickel Co to revise and expand this reference work. The material for the first edition was derived from many skilled fabricators of austenitic stainless steels. Revisions and additions have been made in the light of improved and expanded knowledge of how to form these materials. New processes are described, especially those using one solid die. Further, the book explains the effect of various compositions, tempers and finishes on forming characteristics.

•

JOB EVALUATION METHODS — *By Charles Walter Lytle, professor of industrial engineering, New York University. Second edition. Published by the Ronald Press Co, 15 E 26th St, New York 10. 507 pages, 6 x 9 in. Price, $7.50.*

Judging from the companies which use this technique, job evaluation is here to stay, and, for certain kinds of work, perhaps it is a good thing, as long as the cart doesn't get put before the horse. However, the material which has been added to this second edition, to bring the book up to date, raises some interesting questions about the validity of job measurement.

The new subject matter covers jobs in supervisory, technical, and executive positions, and discusses the features of various kinds of wage incentive plans. The wage incentive chapter is straightforward, and needs no particular comment. It is the description of evaluation

Lagging Public Construction — A Spreading National Blight

The most recent editorial in this series dealt with the plans of American industry for expanding and modernizing its plant and equipment over the next four years. These plans call for the expenditure of $113 billion over that period. There is a good prospect that the money to carry them out will be available. If the plans are carried out, manufacturing capacity at the end of 1958 will be double that which existed at the end of World War II. And this industrial plant will be modernized.

In sharp contrast to this picture is the condition of our *public* plant and equipment — the roads, schools, water supply, health and sanitation facilities upon which industry, as well as the average family, depends. **According to a recent estimate by the Twentieth Century Fund, the people of the United States must spend almost $100 billion on new public works projects during the next five years merely to meet the minimum needs of our growing economy.**

Other estimates by the President's Council of Economic Advisers, by state agencies and by private construction economists all show the same condition: a staggering need for public works. Yet no steps have been taken that even offer a promise of closing the gap between the public facilities we are building and the greater facilities we really need.

How did we come to let our public facilities fall into this sorry state? Here are some of the reasons:

(1) During the years of depression and war, from 1930 to 1945, these facilities were neglected. New construction declined, and even maintenance was cut.

(2) Since the end of World War II, increased construction costs have made it difficult for communities to get the needed construction with the funds budgeted in the past for that purpose.

(3) The great postwar upsurge in population, and the spreading of our population into new areas, has created a huge demand for additional community facilities before the neglect of earlier years could be made up.

Responsibility Divided

Now the need for more public construction has become apparent to everyone, on jammed highways and in over-crowded schools. But, unfortunately, the responsibility for doing something about this situation cannot be so clearly fixed as can the responsibility for maintaining industrial facilities. A business firm must expand its capacity when markets are growing or lose its trade position. It must modernize its plant and equipment or be undersold by more efficient competitors. In the case of public facil-

ities, there is no such competitive incentive. To be sure, a city or state may lose population and industries if its public facilities are inadequate. But such shifts are very slow to take place and difficult to relate to any specific public program, or lack of it.

Moreover, the responsibility for constructing public facilities is divided between state and local governments and federal authorities. Within each of these governmental units there are specialized bureaus or departments with varying responsibilities. This division of responsibility obviously adds an element of difficulty to the development of an adequate program of public construction.

Breaking the Log-Jam

How can this administrative log-jam be broken and the financial difficulties overcome?

One course would be to have the federal government step in with a nation-wide new program of direct spending on public works. That would utilize the resources of the federal treasury for immediate action. But there are weighty objections to such extensive federal participation. One is that federal spending cannot be greatly enlarged without a corresponding increase in the federal control of decisions that normally have been left to local communities. Another objection is based on the fact that so long as we must maintain a large defense establishment, such an addition to federal spending means either higher taxes or a chronically unbalanced budget.

The other course is to rely primarily on local initiative, but with new and more effective federal aid to local governments. Such aid would help speed up planning and construction, and contribute toward a solution of the most burdensome financing problems, but in amounts sufficiently limited to require that most of the capital be raised locally.

No Single Formula

No one formula can be applied to make such aid effective. The raising of funds for new schools, for example, involves problems very different from those of financing highways, or water-works, or hospitals. But it does seem clear that, in all these fields, the federal grants must be designed to stimulate more local planning and financing than has prevailed in the past. Among the new ideas that may offer such incentives are federal grants for planning and initial costs and federal guarantees of local bond issues. Such aids have been remarkably effective in the fields of slum clearance and public housing.

While the federal government clearly has a role to play, we cannot afford to postpone inauguration of an adequate public construction program while we seek a formula to apportion governmental participation that would be generally accepted as ideal. Every year about 2½ million more Americans are putting increasing pressure on a public plant already dilapidated and inadequate. The result is an increasing menace to comfort, health, education and safety. It is also an increasing menace to the effective performance of American industry.

The appropriate public response to this situation is a driving public determination to eliminate this increasingly dangerous lag in public construction. At this juncture, the development of such a determination is basic. Nothing stands in the way of an adequate program of public construction that a determined electorate cannot remove.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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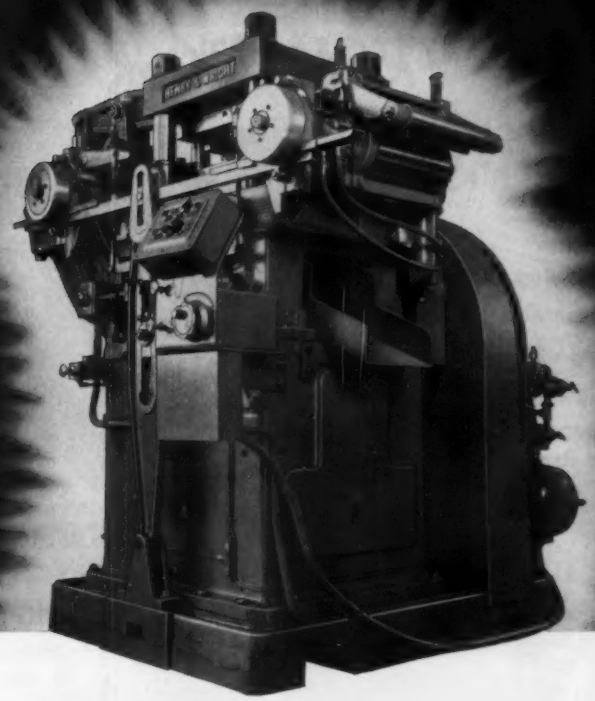
HENRY & WRIGHTS



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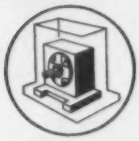

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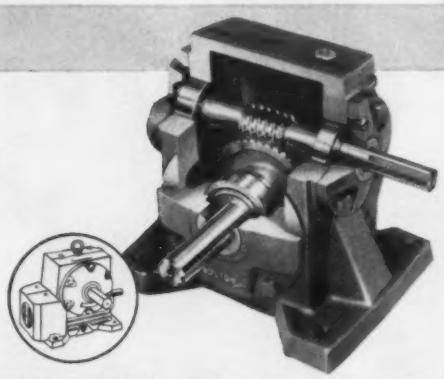

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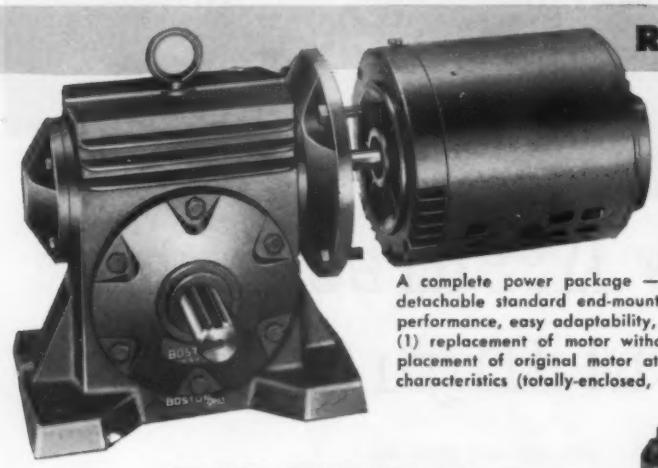

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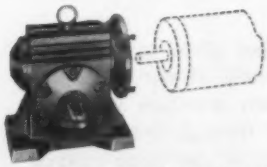

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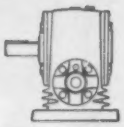
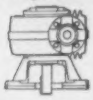
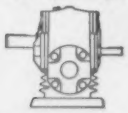


Horizontal Right Angle Drive Worm gear on top

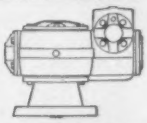
Horizontal Right Angle Drive Worm gear under



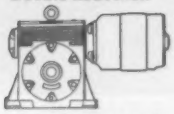
Vertical Right Angle Drive



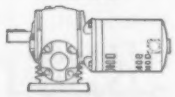
Horizontal Parallel Drive Double Reduction



Vertical Right Angle Drive Double Reduction



Horizontal Right Angle Ratiomotor



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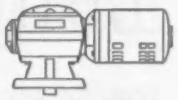
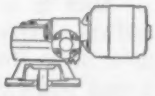


Vertical Right Angle Ratiomotor



Vertical Right Angle Ratiomotor Double Reduction

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of executive positions which deserves careful study.

The superficial aspects of a job—working conditions, number of people supervised, and so on, are simply judged, and can easily be related to some basic scale of value. (Whether everyone would agree with the scale of values is another matter.) But when the *content* of executive jobs is being measured, it is hard to see how an industrial engineer working from a manual of job classifications can properly weigh factors that the most experienced executive has trouble appraising when, for example, he is faced with the problem of hiring a new man for a supervisory position.

Regardless of this objection, the book under consideration is a thorough and objective report of the principles of job evaluation (at their present stage of development) giving numerous examples of the various methods which are in current use.

•

New Films

YANKEE TOOLMAKER. *Produced by the Bullard Co, Bridgeport 2, Conn. 16 mm, color, sound. Running time 27 min. No charge.*

In a most unusual presentation, this new film tells the story of early America and the development of Metalworking. It shows what machine tools mean to a modern world. A great deal of care has gone into the preparation of the story and into research for historical accuracy. Scenes were taken at Sturbridge Village, Sturbridge, Mass; at Mystic Marine Museum, Mystic, Mass; and at the Long Island Auto Museum, Southampton, NY.

•

Names in the News . . .

William P Drake, executive vice president of Pennsylvania Salt Manufacturing Co, has been named president to succeed **George B Beitzel.** The former president will continue as a board member, and will serve, in addition, as chairman of the board of Pennsalt International Corp, a subsidiary.

Robert G Callison, sales manager, Peters-Dalton, Inc, Detroit manufacturer of paint spray booths and industrial washing equipment, has

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1. **Machine Tool Show (International Amphitheatre)**
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Write for these new catalogs to preview our "tools in action" display at the Coliseum Machinery Show, Booth #702.

✓CHECK the wide range of Sheldon precision toolroom and production lathes, milling machines and shapers you want to be sure to see.

✓CHECK the important features of these modern machine tools that you will want demonstrated.

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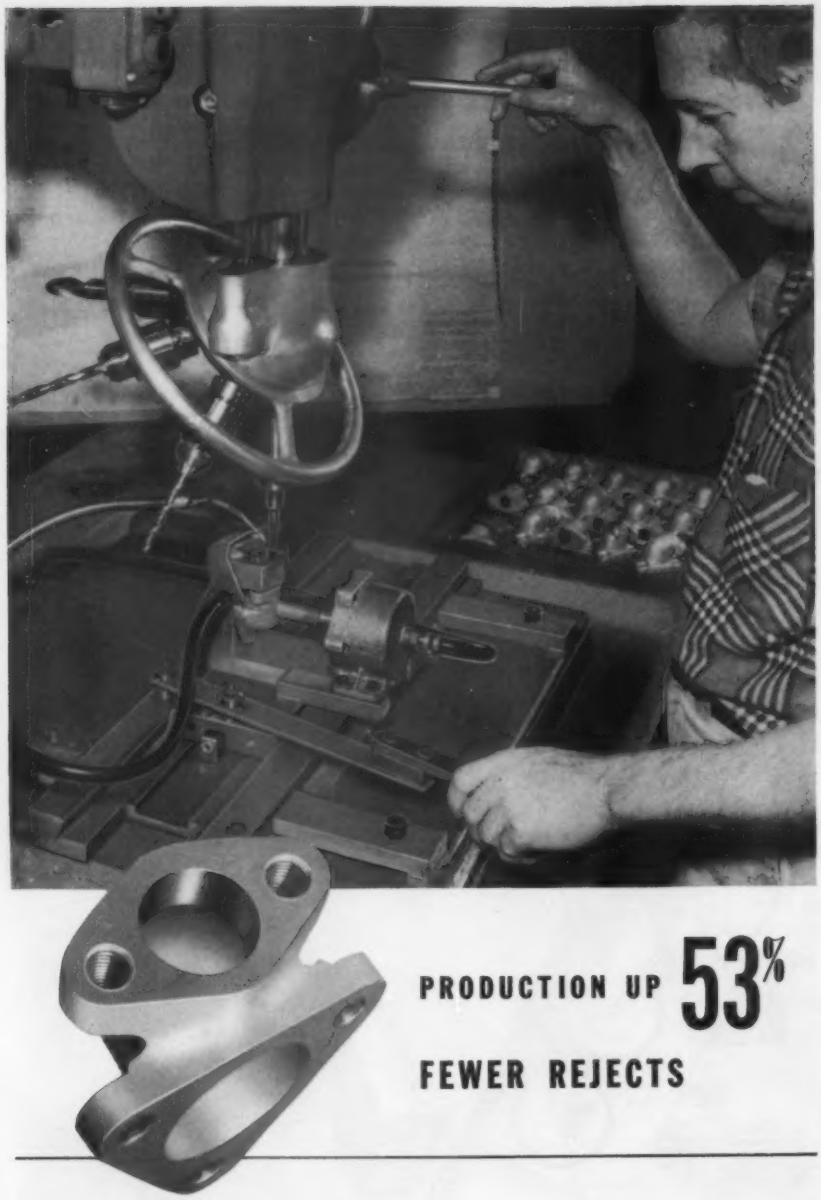

PRODUCTION UP 53%

FEWER REJECTS

HOWE & FANT TURRET DRILL CASE HISTORY

#25

Part — Aluminum elbow

Fixture — 3 position, lever transfer, air clamp, bolted to machine table.

Operations

I Load. **II** Spot 2 holes 3/8 x 90°. **III** Index turret and drill 2 holes .272" dia. .625" deep. **IV** Index turret and tap 2 holes 5/16—24 class 3 fit .520" deep. **V** Index turret and core drill 1 hole .801" dia. .410" deep. **VI** Unload and clean.

Production rate — 73.2 pieces (512.4 machining operations per hour).

Comment

Job is a "natural" for the H&F turret drill. Part is clamped by air in simple fixture lever actuated to provide 3 predetermined working positions. This assures minimum transfer time and proper location of part under working tool. Each tool turns at optimum preset speed in this case:

Spot drill	1825 r.p.m.
.272" dia. drill	2375 r.p.m.
5/16—24 tap	1150 r.p.m.
.801" dia. core drill	825 r.p.m.

Tap automatically reverses at twice forward speed at preset depth. All depths controlled within .002".

Set-up increases production 53% over 4-spindle drill press with box jig. Rejects are virtually eliminated, tool life greatly increased. The H&F installation has won unanimous operator approval by appreciably cutting fatigue while increasing output.

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been elected vice president in charge of regional sales. **T Kenneth McGuire,** general manager, Industrial Sheet Metal Div, has been named general sales manager.

Frank Machac, superintendent of tools for the Shakeproof Division plant of Illinois Tool Works, has been promoted to plant superintendent.

George H Compter, assistant to the vice president, and secretary of Ford Instrument Co, Division of The Sperry Corp, has been appointed consultant on synchros and servo devices to the Electrical Equipment Div, Business & Defense Services Administration, US Dept of Commerce. Mr Compter will serve for a period of at least six months.

Harold Nutt, vice president and general manager of Borg-Warner Corp's Borg & Beck Division, has been elected president, succeeding **T L Knecht,** retired. **Clyde Bissell,** secretary, treasurer, and controller, has, in addition, been appointed vice president.

Arthur L Schleppy, director of production planning and materials control for Consolidated Engineering Corp, has been named to head a newly created Materiel Department. Appointed to supervise the department's three sections: **Howard B McCord,** production planning; **Oscar W Moore,** material stores; and **William F Miller,** shipping and receiving.

Emory W Worthington has been appointed vice president, engineering, of George F Motter's Sons, York, Pa, designer and builder of printing machinery.

Gerald B Brophy, general counsel and a director of North American Aviation, Inc, has been elected a vice president of the company.

Allegheny Ludlum Steel Corp appointments: **Richard J Swan,** manager of the Pacific Coast area, to director of sales, magnetic and electronic materials; **Milton M Fenner, Jr,** manager of tool steel sales, to director of sales, tool and die steels; **Karl A Elers,** manager of product development and engineering service, to succeed Mr Swan; and **Irving R Leheney,** assistant product manager, to succeed Mr Fenner as tool steel product manager.

Edward P Gebhard, guided missile propulsion expert, has been named technical director of the Defense

TWIN MACK-HEMP HEAVY-DUTY ENGINE LATHES
help meet expanded production schedules

Recently two 84-inch Mack-Hemp heavy-duty engine lathes were installed in General Electric's turbine factory at Schenectady, New York, to help increase production of large steam turbine-generator units.

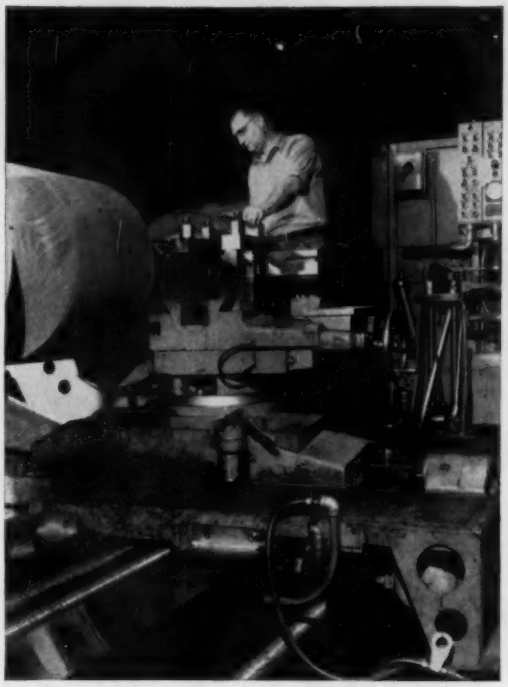
These large precision lathes are used to machine heavy steel forgings for turbine and generator rotors up to 60 inches in diameter and 40 feet in length . . . some forgings weigh over 100 tons. Tolerance on certain dimensions—plus 0.001 inches minus 0.000 inches.

The following lathe characteristics indicate their heavy-duty capacity and versatility:

1. 100 HP Variable-Speed Main Drive.
2. Rigid three-way bed with hardened and ground liner plates.
3. Independent Power Feed and Rapid Traverse to each carriage, Cross Slide and Compound.
4. Minute tool feed—carriage can travel as slowly as 0.005 inch per minute.
5. Extra heavy-duty tail stock with built-in live center capable of carrying 120 ton work piece . . . thrust bearings pre-loaded to controlled pressure . . . protection provided against thrust overloads due to thermal expansion of work-piece.

Each lathe is equipped with two identical tool carriages with operator stations to control all functioning.

If your plant has a lathe problem, remember it pays to keep an eye on what's new and progressive at Mack-Hemp. Write for further information on Mack-Hemp Lathes.



Close-up of work area of one of the 84-inch Mack-Hemp Engine Lathes. Shown here is carriage with cross slide, compound slide and tool rest. Swing over the 3-way beds is 86 inches and swing over carriage is 70 inches.

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DIVISION OF E. W. BLISS COMPANY

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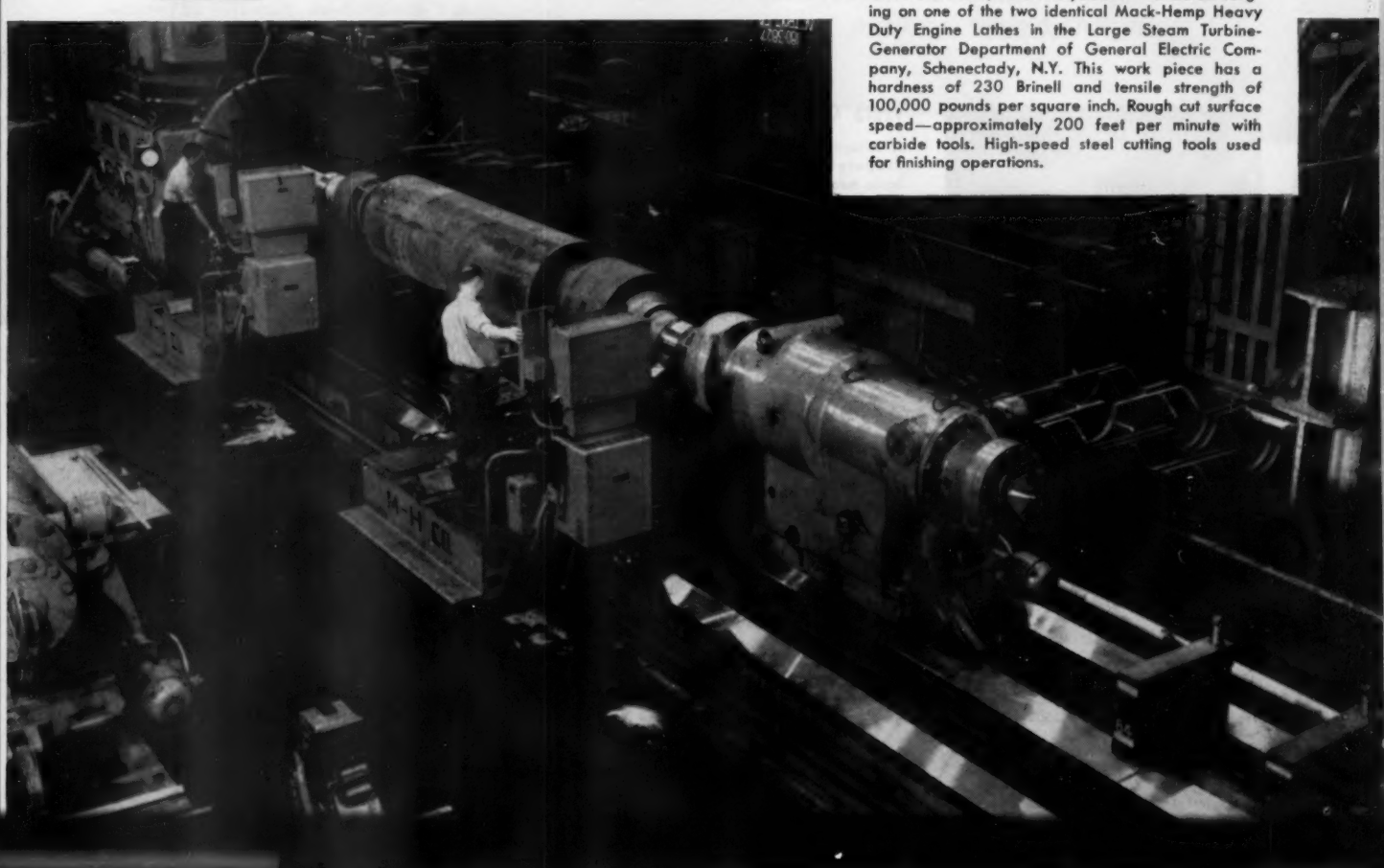

Generator rotor, nickel-molybdenum-vanadium forging on one of the two identical Mack-Hemp Heavy Duty Engine Lathes in the Large Steam Turbine-Generator Department of General Electric Company, Schenectady, N.Y. This work piece has a hardness of 230 Brinell and tensile strength of 100,000 pounds per square inch. Rough cut surface speed—approximately 200 feet per minute with carbide tools. High-speed steel cutting tools used for finishing operations.

NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.

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Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels : Wire Straightening Equipment : Slide Feeds for Presses : Wire & Ribbon Stock Forming Machines

Products Division of M W Kellogg Co, a subsidiary of Pullman Inc. Mr Gebhard has been with the Navy's Bureau of Ordnance, serving as program director on metal parts for guided missiles and jet assisted take-off units.

Major General Frank H Lamson-Scribner (USMC, Ret) has been named executive associate to the president of Onsrud Machine Works, Chicago.

Carl W Dobos, production manager of the Buick - Oldsmobile - Pontiac plant at Linden, NJ, has been appointed manager of the BOP Assembly Division's Framingham, Mass plant. He succeeds **Clare S Swayze,** transferred to the general manager's staff in Detroit. **Charles Katko,** chief inspector at Linden replaces Mr Dobos, and **John M Haldeman,** superintendent of the chassis department, takes over Mr Katko's post.

W H Lee has been named manager of government sales and contracts for Electric Products Co, Cleveland, Ohio. Prior to joining the company, Mr Lee spent four years in Oak Ridge, Tenn, as chief engineer of Edenfield Electric, Inc.

Thomas G Lewis, buyer for Youngstown Sheet & Tube Co, has been appointed assistant to the director of purchases.

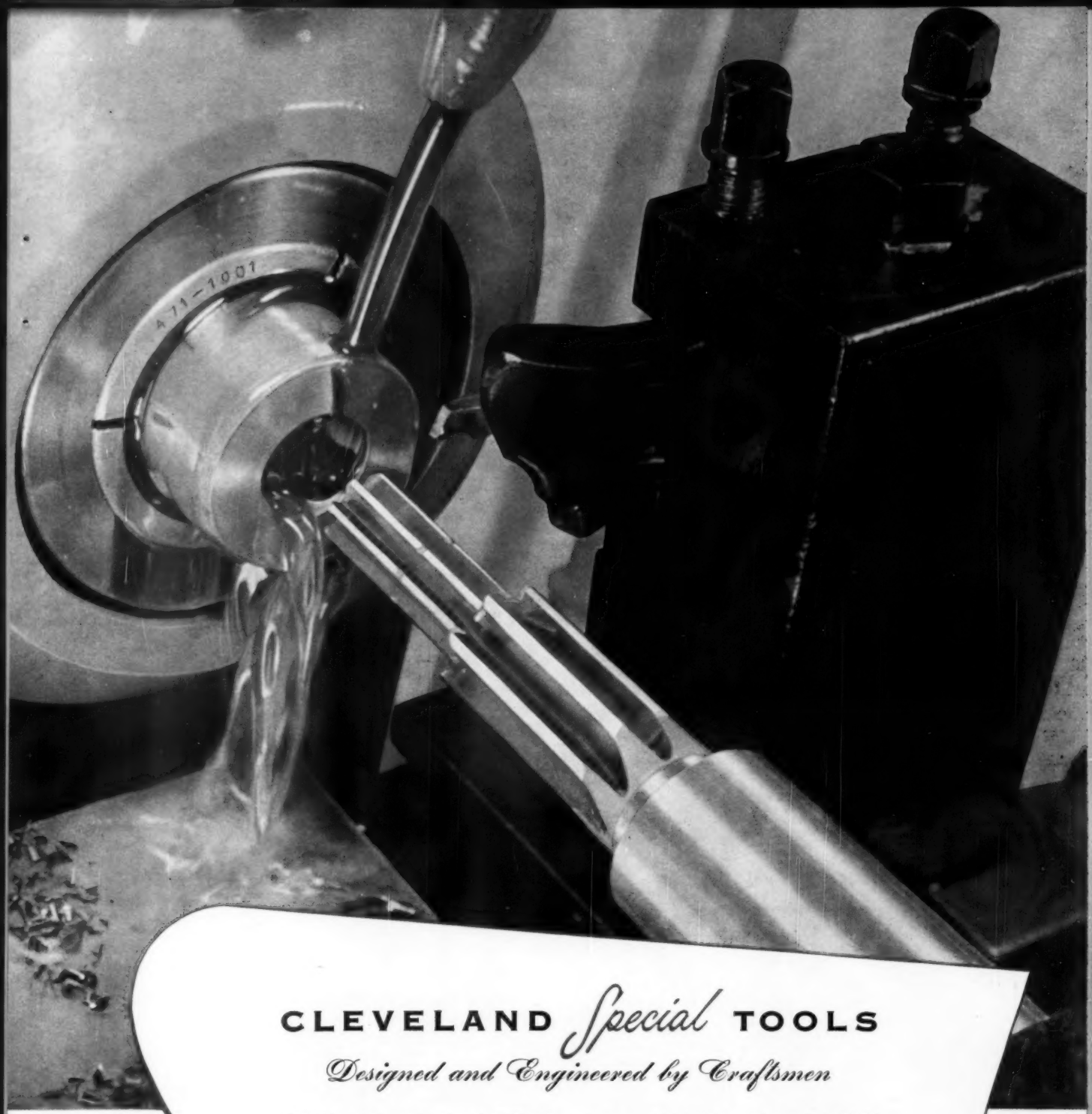
A C Breitenbeck, manager of process and methods for Chrysler Corp's Defense Operations Division, has has been appointed manager of the company's West Coast Div's Detroit office.

Kenneth A Honroth, secretary and treasurer of Freeway Washer & Stamping Co, Cleveland, has been elected president of the company; he succeeds **Clifford A Rooke,** who has resigned. **Walter S Sutowski,** co-founder of the company with Mr Honroth, takes over the new president's former duties.

L W Buechler, manager of control product sales for Vickers Inc's Electric Division, has been named chief engineer.

Louis Greenfield has been promoted from assistant sales manager to product manager of Proto Tools, Los Angeles.

Charles W Mote, assistant plant manager of the Dodge Forge Plant, has been promoted to manager.



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Designed and Engineered by Craftsmen

All CLEVELAND Special Tools are manufactured to the same high standards of quality as regular tools bearing the famous ◈ trademark. Why not take advantage of CLEVELAND's experience, "know-how" and service in designing, producing and testing special Drills, Reamers, End Mills or other tools for your next job?

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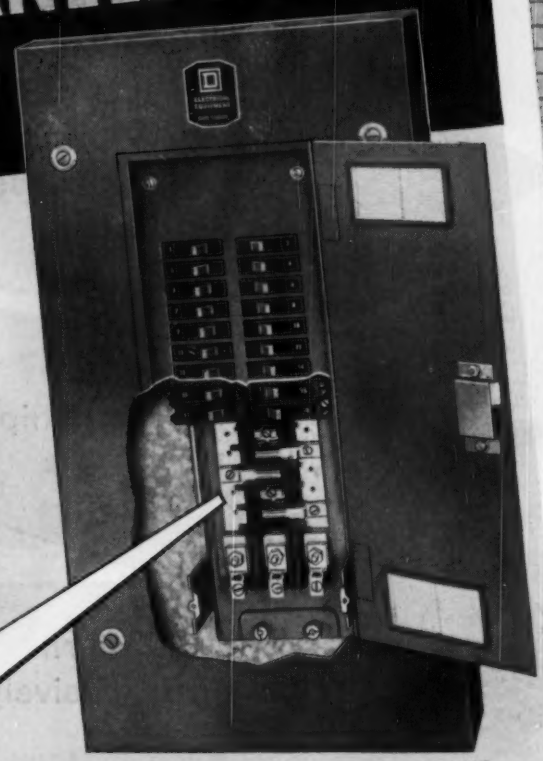
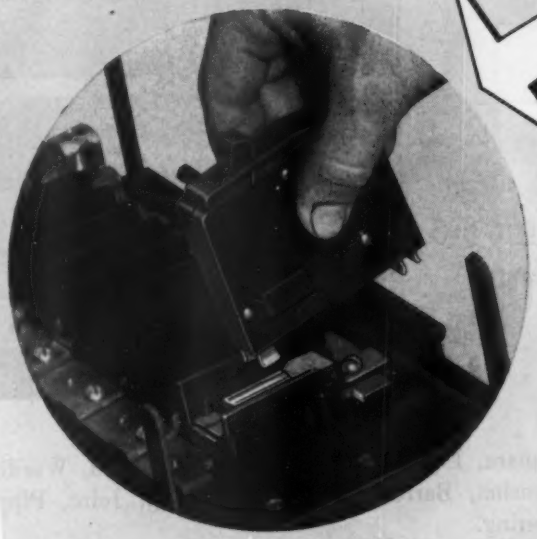


...Get the complete line "Off-the-Shelf" from your Electrical Distributor or have assembled panels shipped right to the job

It's a top quality line throughout! Note the compact, streamlined beauty. A closer look reveals such outstanding features as: Distributed phase bus arrangement with clear identification for simplified load balancing. Adjustable, indicating trim clamps. Galvanized box with large gutters for real accessibility, yet compact enough to mount between 16" wall studs. Most important of all—the new NQO panelboard offers you the finest breaker ever built, with exclusive **SWINGRIP** mounting.



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- Sensitive calibrated magnetic trip assures quick and consistent response to harmful overloads or short circuits.
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- Positive action of handle against contact members guarantees circuit opening.
- Compact design—¾" width for each pole conserves valuable space.
- Exclusive **SWINGRIP** mounting provides easier installation, automatic alignment, positive contact with bus bars.

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...plus the craftsmanship of specialists in

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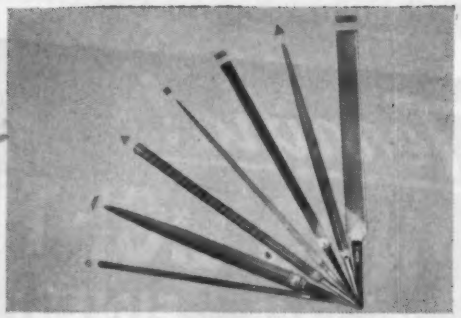

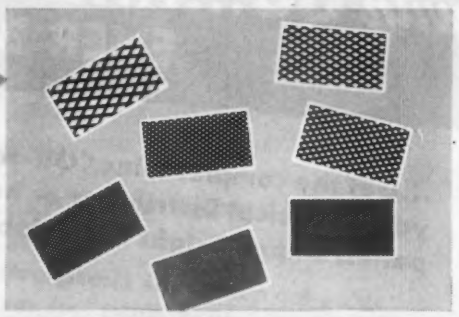

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Toward achieving accuracy in precision work, the first rule of the tool, die, model and fine-instrument crafts is to use files which in themselves are precisely made, carefully hardened, uniformly correct and efficient.

Individual types include: Knife, Round Straight, Half Round, Metal Saw, Square, Pillar Narrow, Three Square, Equaling, Round Tapered, Hand, Warding, Crochet, Barrette, Slitting, Crossing, Joint, Pippin, Testing.

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If greater or less driving force is required, the Cushman Engineering Department can design wrenches to suit your needs. Write Cushman for Bulletin No. 211D fully describing and illustrating the Cushman Power Wrench — or, should you have a special work-holding problem, consult Cushman.

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If you have a centrifugal pump problem, we can help you solve it. As originators of the motor driven machine tool coolant pump, Ruthman has developed many types of centrifugal pump applications including coolant pumps, agitators, molten metal pumps, etc. Send us complete information on your pump requirements, perhaps one of our many models with slight modification will solve your specific problem.

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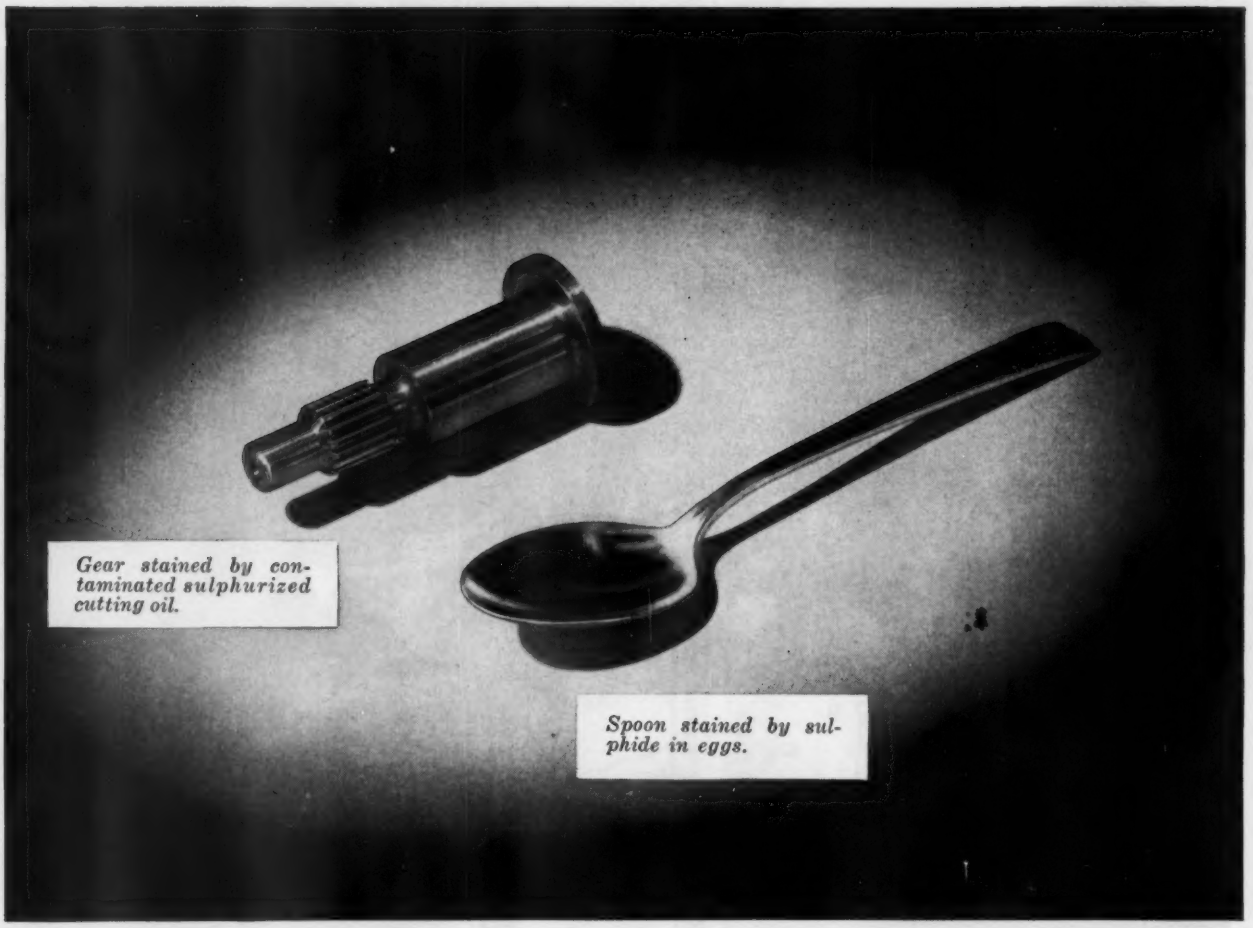

Gear stained by contaminated sulphurized cutting oil.

Spoon stained by sulphide in eggs.

Sulphur Staining on Ferrous Parts is Harmless

Staining of machined ferrous parts caused by cutting fluids containing active sulphur is similar to the stains you find on your silverware. It has no adverse effects whatsoever on the finish, or characteristics of the metal. *It is not corrosion*, and according to automotive and military authorities, in no way affects service life.

Experience has proved that cutting fluids containing active sulphur provide far better performance when machining the tougher steels. Staining can only occur during very humid conditions or when water is allowed to contaminate the sulphurized cutting oil. A sample piece of metal will not stain in a cutting fluid free of water . . . but often it will the moment moisture is added.

The *important* factors to consider when selecting a cutting fluid are surface finish, production and tool life. Here is where a cutting fluid pays for itself. Ask to have "the Man in the Barrel", your Stuart Representative, help select that Stuart Oil that will produce the very best results under the conditions you will subject it to.

Further information on sulphur staining is provided in the D. A. Stuart Shop Note Book, Bulletin S-1. Write for your copy.

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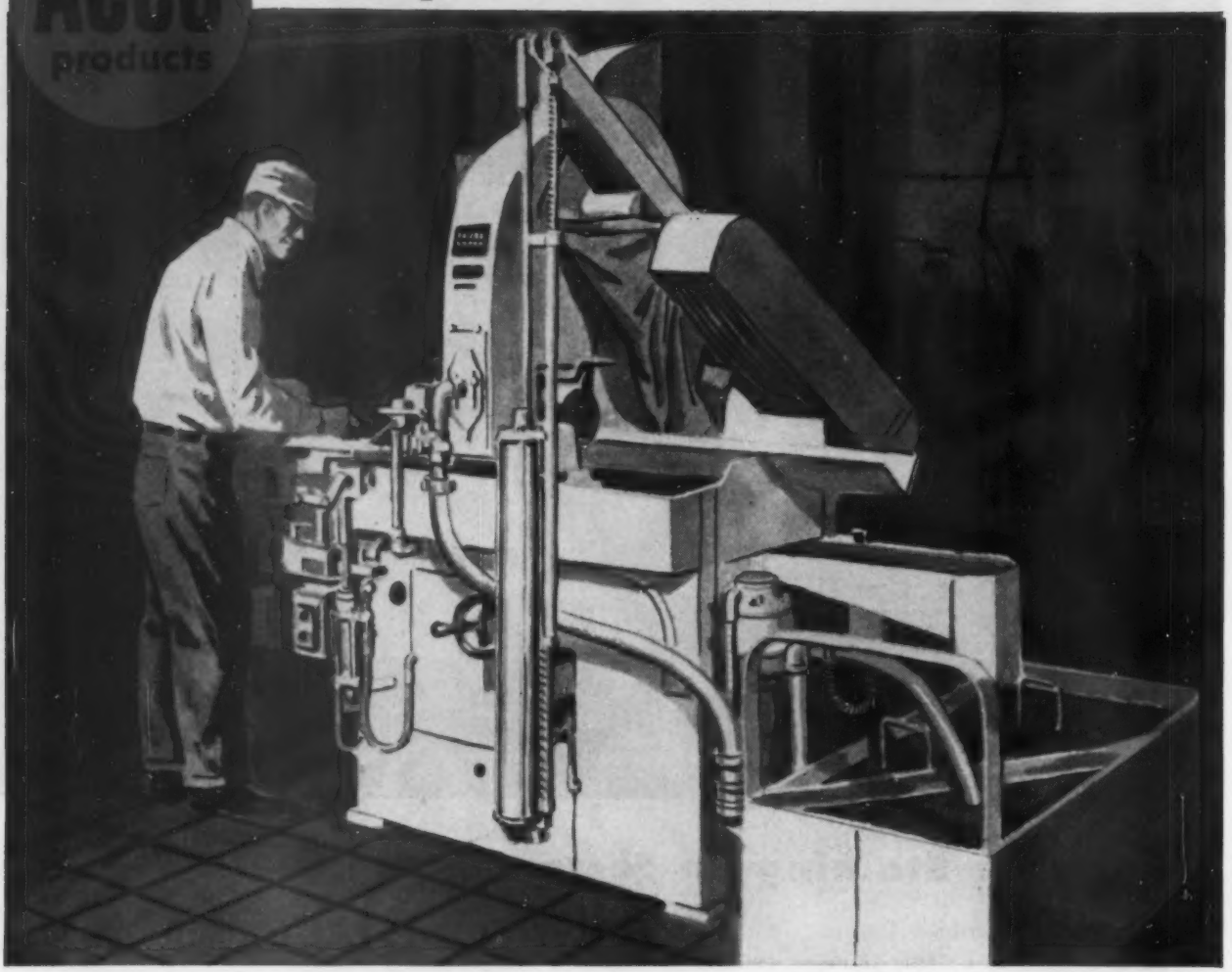
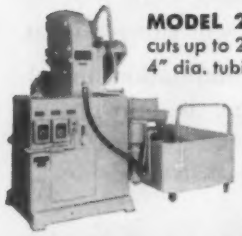
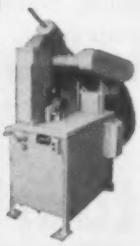


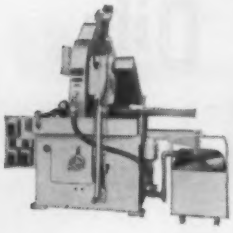
Reduce cutting time on alloy and high carbon steel from minutes to seconds...



MODEL 223
cuts up to 2" dia. solids; 4" dia. tubing



MODEL 28 SEVER-ALL
dry cutter with capacity to 4" x 4" solids



MODEL 406 CUTAMATIC
cuts up to 6" dia. solids

• CAMPBELL Abrasive Cutters reduce your labor costs and the number of machines required. They do it by cutting alloy and high carbon steel in seconds instead of minutes. They give you a clean, smooth cut without work-hardening, and often eliminate finishing operations.

A complete line of CAMPBELL Abrasive Cutters—fully and semi-automatic—are available to fit your specific cutting requirement. CAMPBELL sales engineering experts will help you select the cutter your work demands. They will consult with you on cutting problems.

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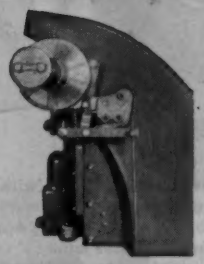
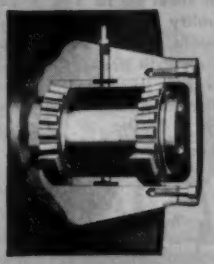
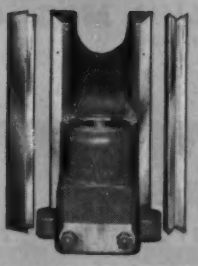
No. 7 Flywheel type
Capacity, 80 tons



• Non-Repeat Clutch. An exclusive Federal feature.



• Timken Bearing Flywheels. Eliminate wear on crankshaft, readily adjusted.



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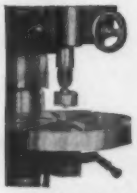

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- And Many Other, Worthwhile Features

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Mills, core-drills, drills, countersinks and individual-lead-screw taps 206 intake manifolds an hour gross!

Economy and auto*mation* are combined in this Special to form another example of the way Buhr *Economation* reduces production costs for leading manufacturers.

This 6-way dial-type hydraulic-feed Buhr Special is equipped with a 72″-diameter 8-position automatic index table, complete with shot bolt.

Chip disposal is accomplished by an automatic rotating chip conveyor, attached to index.

Operations formerly accomplished by eight machines were combined in this Buhr Special —and volume of production was increased! . . . A typical example of Buhr Economation!

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MULTIPLE-SPINDLE
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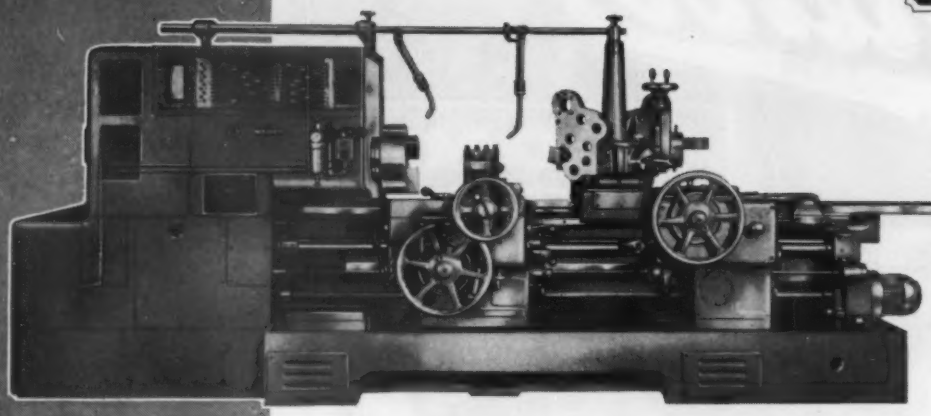

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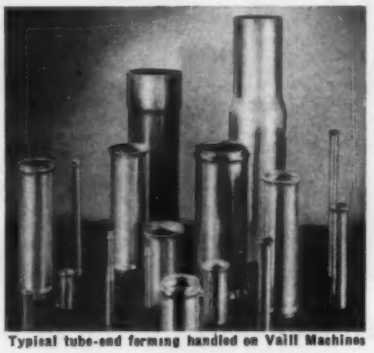

Typical tube-end forming handled on Vaill Machines

**You name the application
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Vaill TUBE-END FORMING MACHINES . . . for air, hydraulic, or mechanical-operation are available to meet YOUR needs, easily, quickly and economically. Full details on request.

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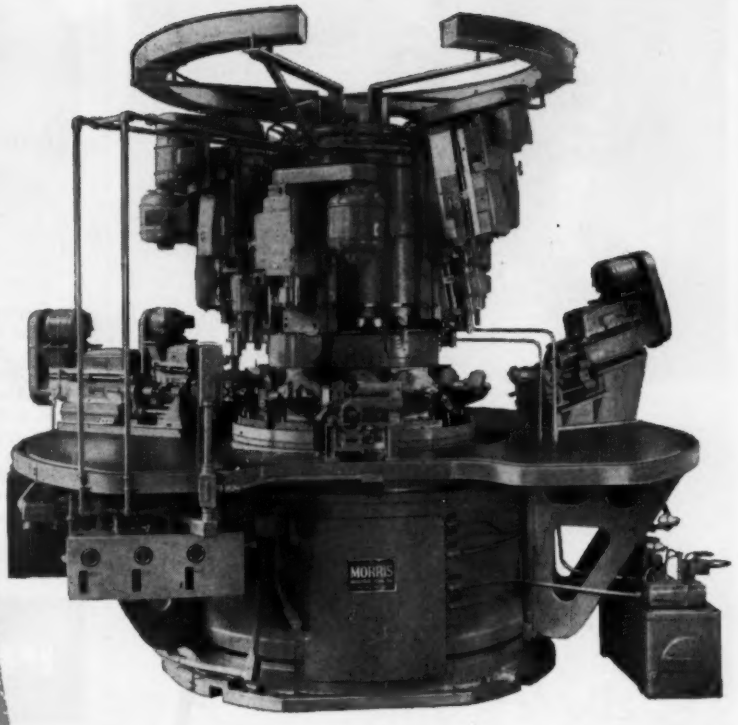
Eliminates model change-over problems!

a production machine—with standard units—quick change-over features—for each year's design change. completely automatic—requires only part loading and unloading.



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MORRIS MOR-SPEED PRODUCTION MACHINE . . . drills, burrs, reams, taps, spotfaces carburetor air horns . . . 375 pieces per hour at 80% efficiency.

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- Trouble-free Hydraulic System
- Wide Range of Spindle Speeds • Convenient Controls
- Air or Oil Powered • Hydraulically Controlled

Designed for a wide range of drilling, reaming, chamfering, spot-facing, hollow milling, centering and related operations, the unit can be mounted in vertical, angular or horizontal positions. Controls may be set to provide almost any sequence of operation. Available for use in special purpose machines like the production machine illustrated.

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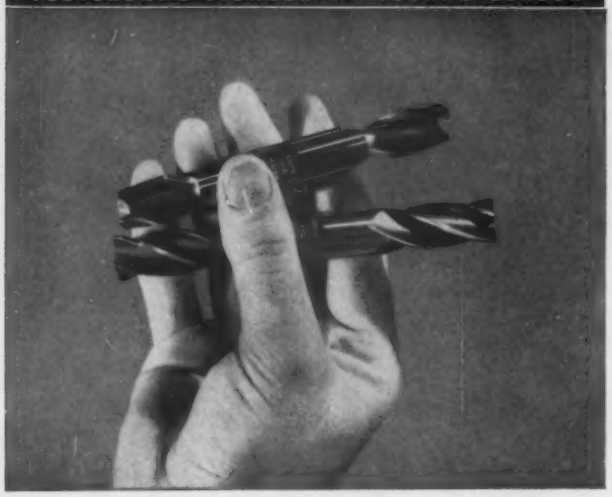

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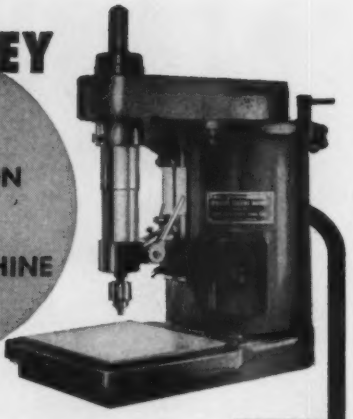

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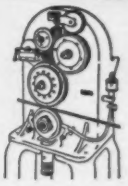

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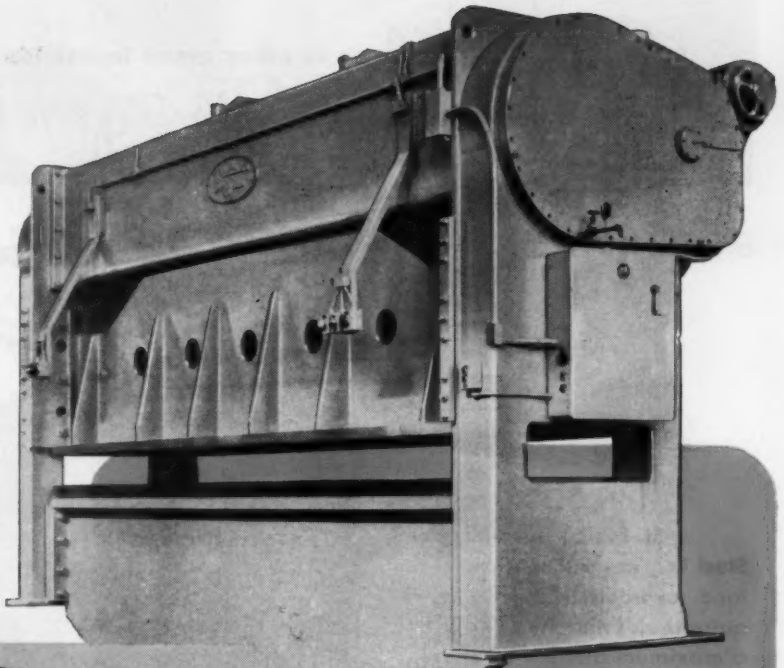

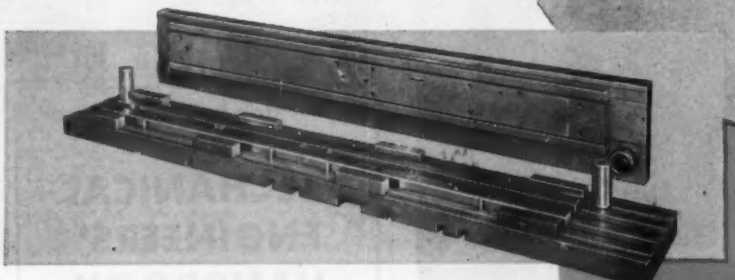

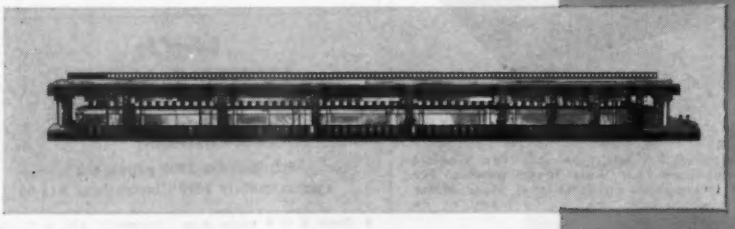

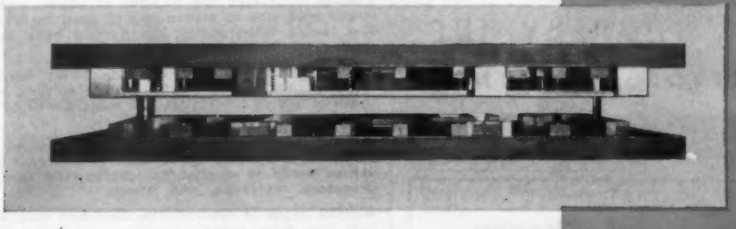

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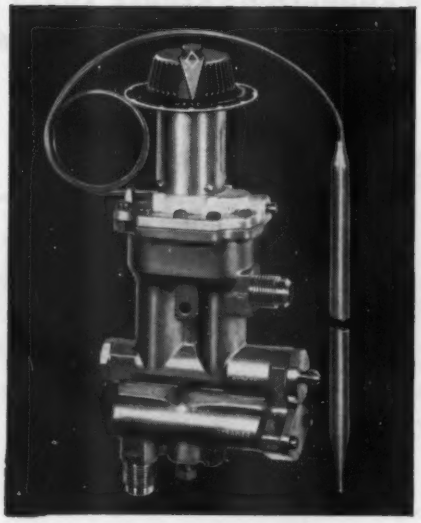

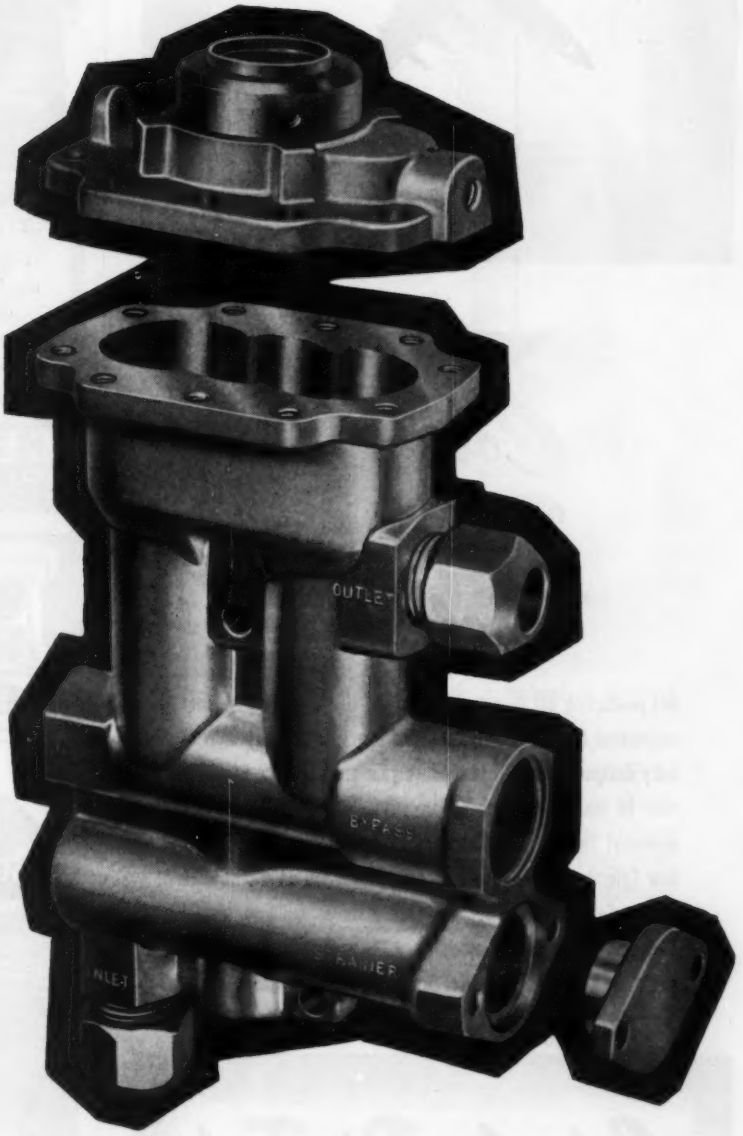

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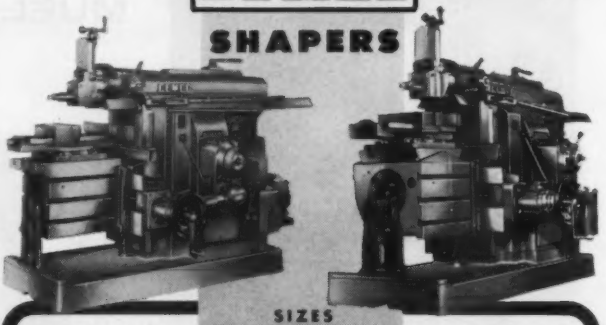

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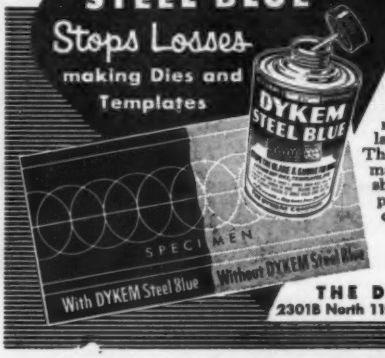

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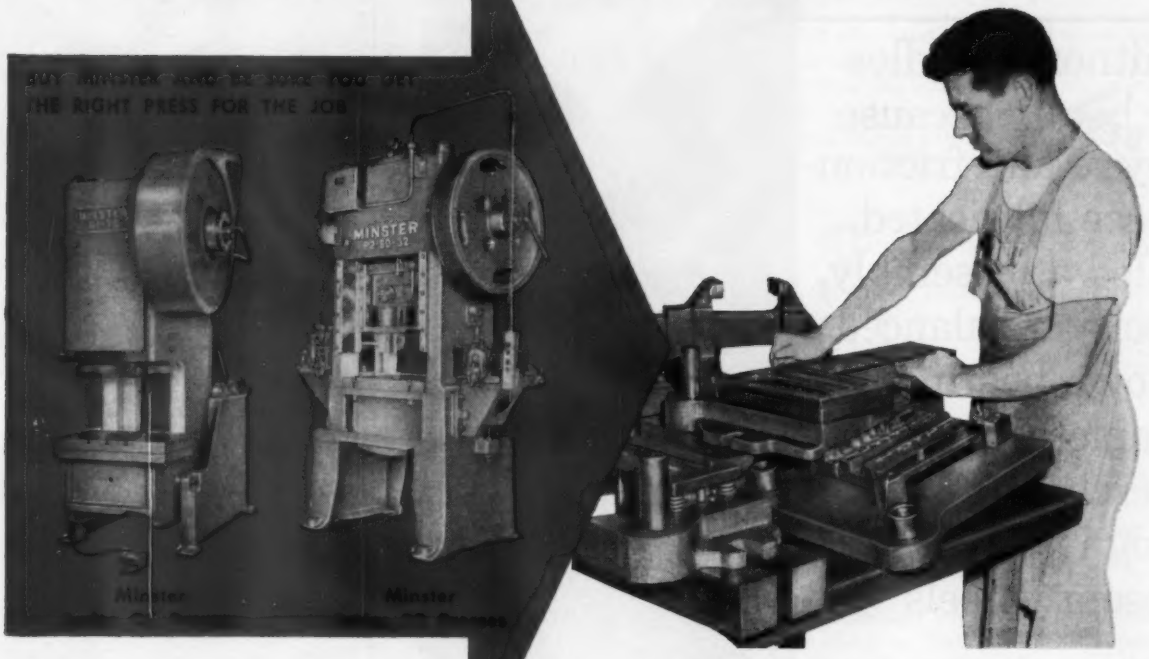

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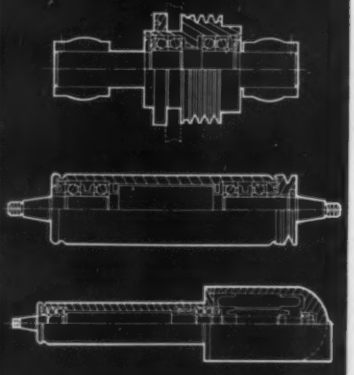

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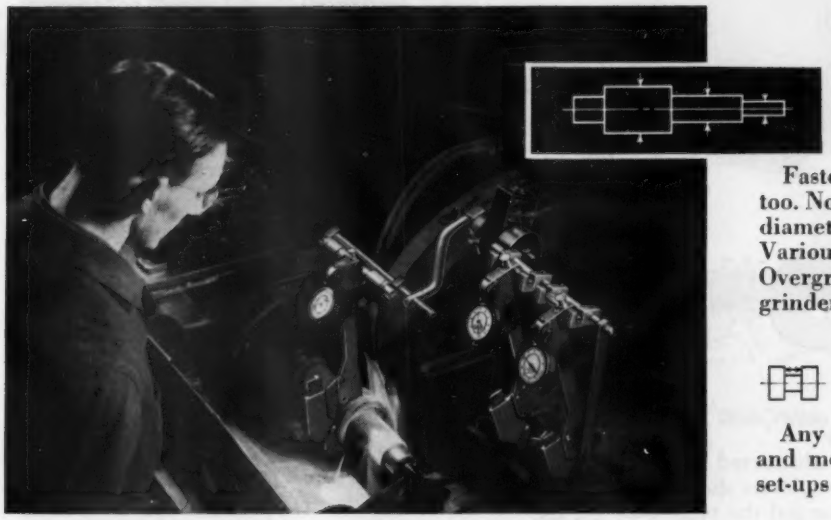

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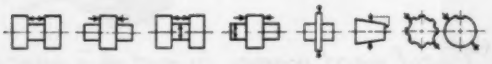
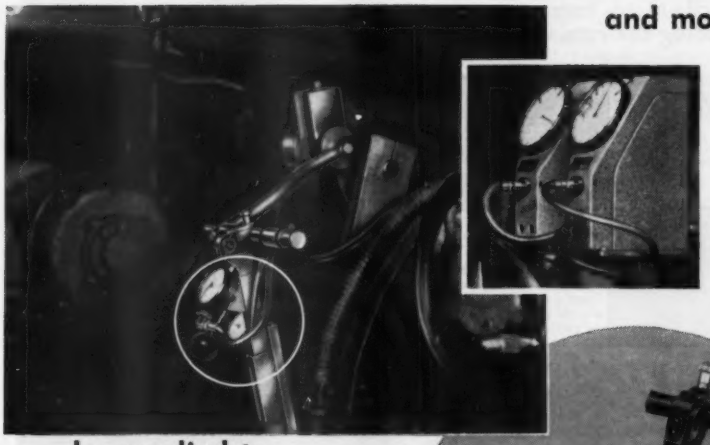


Any of these dimensional requirements, and more, can be gaged with simple gage set-ups to suit.



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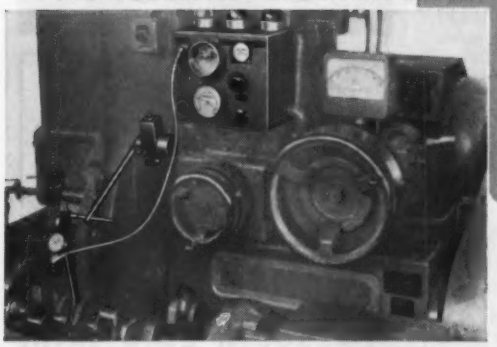

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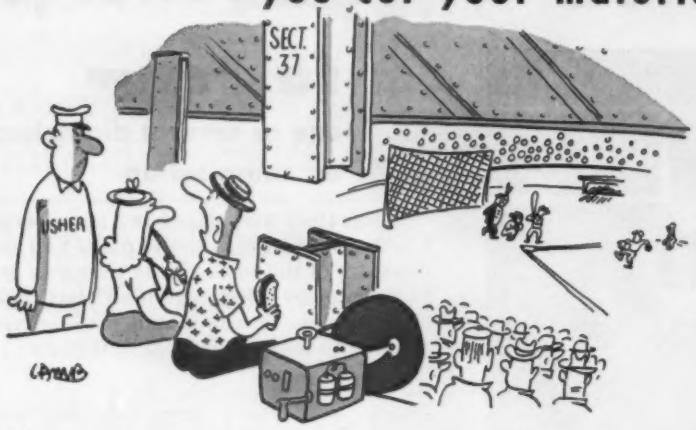

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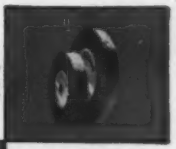

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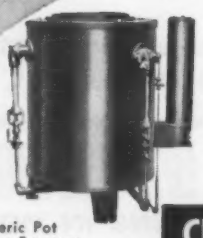

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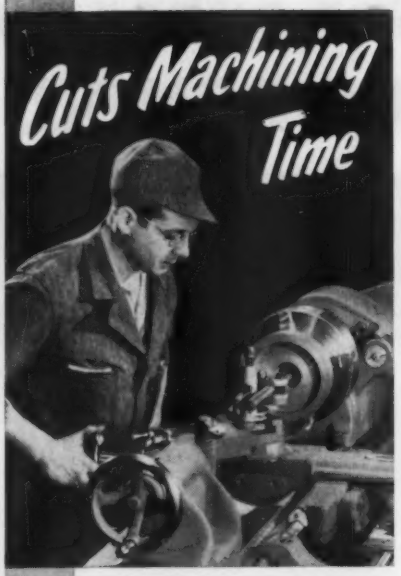

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12-SPEED LATHE

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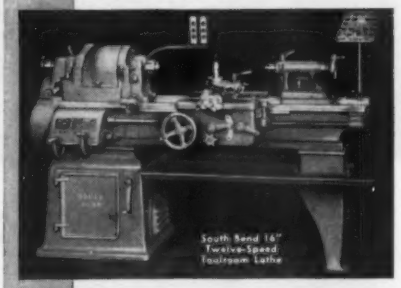

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The A. R. Williams Machinery Company, Limited, Toronto

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FROM THE OFFICE OF THE PRESIDENT

TO OUR FRIENDS AND CUSTOMERS:

This amalgamation is the logical unification of five strong Canadian companies, already linked by common ownership. It will mean an improved and enlarged manufacturing organization; better servicing facilities for its products and those of its principals.

For many years, Standard Machine and Tool Company, Limited, of Windsor, and Modern Tool Works, Limited, of Toronto, have been recognized as leaders in Canada in the manufacturing of machine tools, jigs, fixtures, dies, gauges, etc. Now their combined engineering experience and "know how" is available to Canadian industry.

Already established 75 years and the largest Canadian distributors of machine tools, industrial equipment and supplies, the A. R. Williams Companies now offer their Client the combined knowledge, experience, and facilities of Standard-Modern Tool Company. Additionally, Standard-Modern brings to Canada the benefits derived from close liaison with the parent company in the United Kingdom, Staveley Coal and Iron Company, Limited, which includes among other machine tool manufacturing companies, James Archdale and Co., and George Richards and Co., two world-leading machine tool manufacturers.

A programme of rationalization has been set up to unify the equipment in our manufacturing plants, and a Product Development and Research Department has already been established for this purpose. Special attention will be given to the further development of automation, of which James Archdale and Co., are the original world pioneers.

It is the firm belief of our Board that Canadian industry will secure substantial benefits from this amalgamation. The new organization* provides greater facilities and gives better service.

Old friends, customers and prospective customers who would like to know more about our facilities are invited to drop in and see us, or write us a note. We will be glad to see all visitors and to answer all enquiries.

Harry J. Chambers

President
Standard-Modern Tool Co., Ltd.

H. J. A. Chambers: dmc

* The manufacturing division will be titled Standard-Modern Tool Company, Limited—Manufacturing Division. The component companies of the Sales Division of Standard-Modern Tool Company, Limited, will retain their respective names, The A. R. Williams Machinery Company, Limited, A. R. Williams Machinery Western, Limited, and Pacific Tractor and Equipment, Limited.

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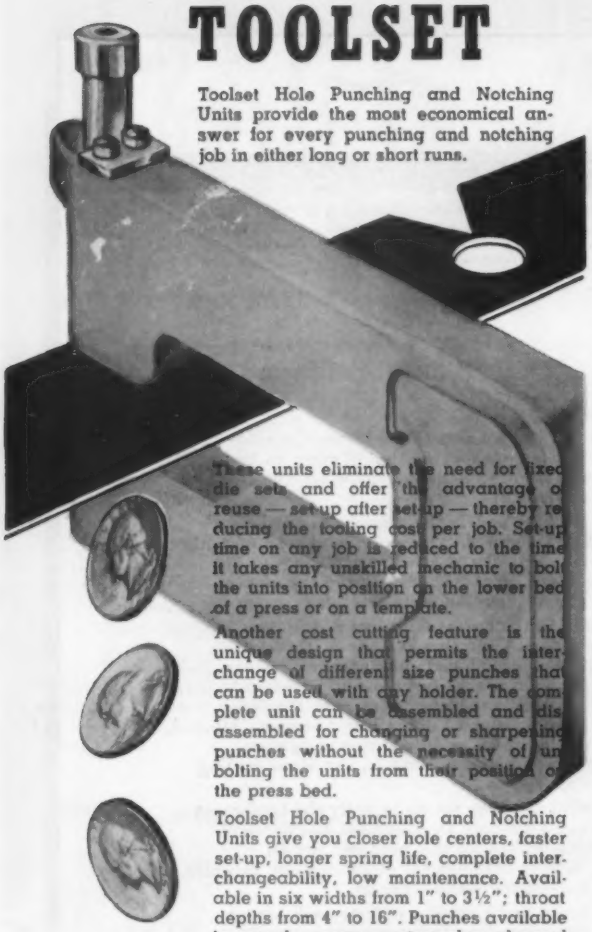
Toolset Hole Punching and Notching Units provide the most economical answer for every punching and notching job in either long or short runs.



These units eliminate the need for fixed die sets and offer the advantage of reuse — set-up after set-up — thereby reducing the tooling cost per job. Set-up time on any job is reduced to the time it takes any unskilled mechanic to bolt the units into position on the lower bed of a press or on a template.

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"Capacity for every Job"

COVEL No. 60

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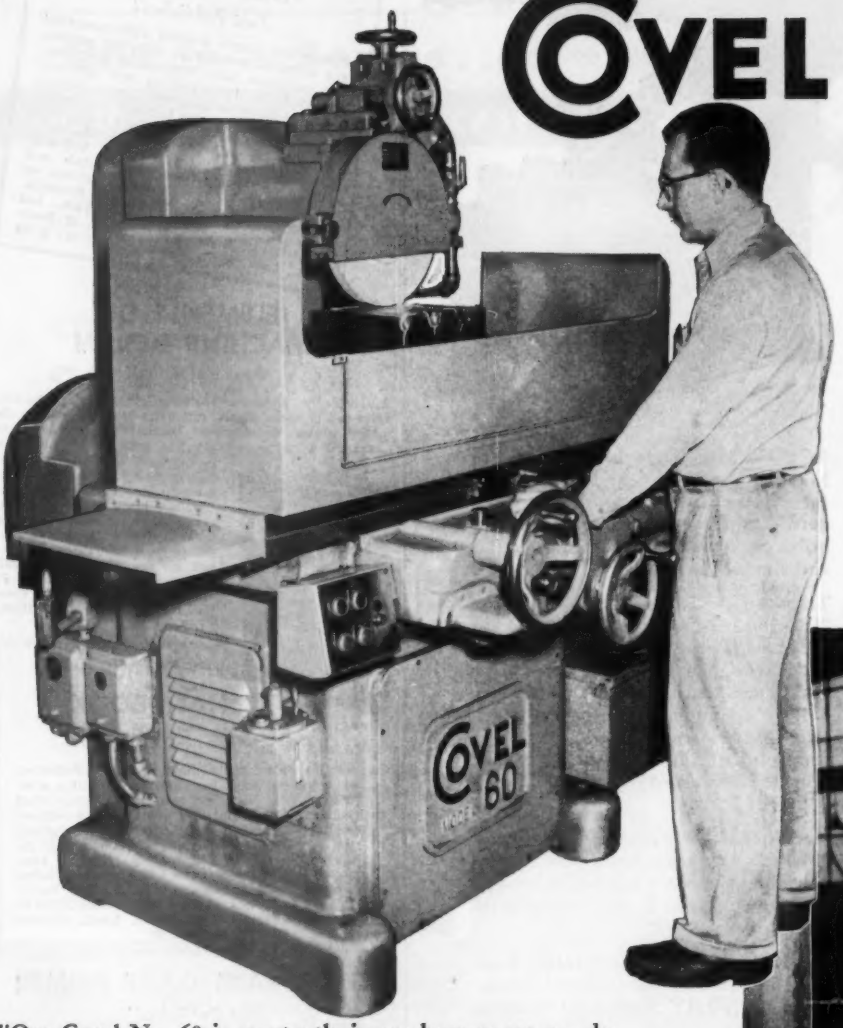
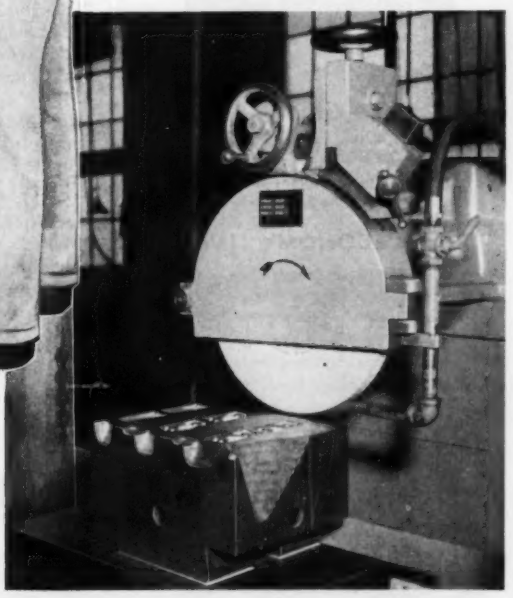


Set up for grinding 340 pound, 10"x 12"x 7½" hammer die for cross over clamp — just one of a wide variety of jobs the Covel No. 60 is performing daily for this Chicago manufacturer.



"Our Covel No. 60 is constantly in use because we can depend upon it to do such a wide variety of jobs. We grind everything on it from thread rolling die blanks measuring 12" x 13½" x 2" to our large hammer dies. And, our operators really like the ease of operation, and the important safety factor provided by the convenient position of the elevating handwheel."

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	(No. 20)	(No. 35)	(No. 60)
Work Capacity	6" x 18" x 12"	8" x 24" x 11"	15" x 24" x 18"
Grinding Wheel	10" x ¾" x 3"	12" x ¾" x 3"	14" x 1" x 3"
Spindle Motor, H.P.	1½	2	3
Floor Space	78" x 58"	97" x 61"	97" x 78"

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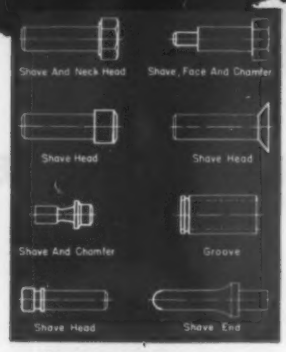
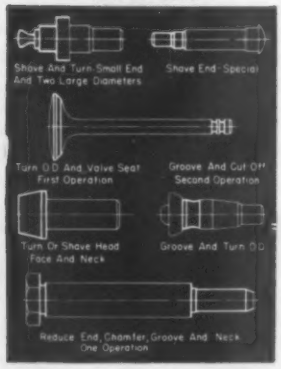


Typical parts machined on the "LS"-3600


Shave And Turn Small End And Two Large Diameters
Shave End-Special
Turn O.D. And Valve Seat First Operation
Groove And Cut Off Second Operation
Turn Or Shave Head Face And Neck
Groove And Turn O.D.
Reduce End, Chamfer, Groove And Neck One Operation

Illustrating operations completed on the S-4300

ECONOMY Automatic Shaving Machines are designed to perform facing, turning, grooving, necking, cut-off and burnishing operations on bolts, automotive valves, projectiles and similar parts.

They are available in two sizes—the "LS"-3600 for body diameters up to 1/2" and lengths under heads from 1/2" through 4-1/2"—the S-4300 for body diameters up to 1" and lengths 3/4" to 6" under heads. Production rates for the standard "LS"-3600 range from 800 to 2400 finished parts per hour and the S-4300 from 450 to 1800 per hour.

Machines are fully automatic and parts flow from hopper to work pan. Simple adjustments plus easy, rapid set-ups enable operator to operate several machines.

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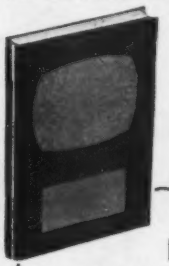

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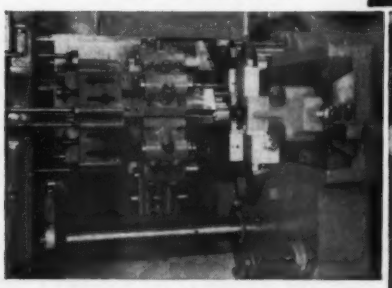
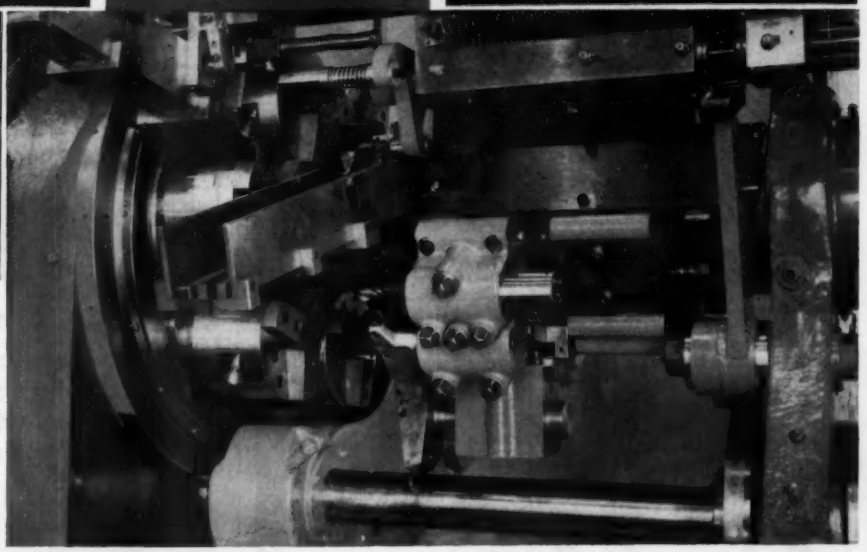


(Above) REAR VIEW OF TOOLING

(Right) FRONT VIEW OF TOOLING
Showing load chute at upper left . . . and unload chute at center . . . both at same station.



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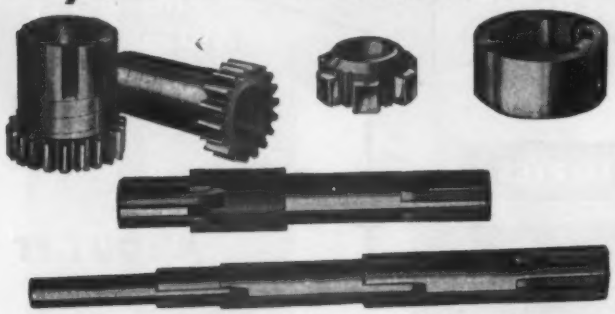

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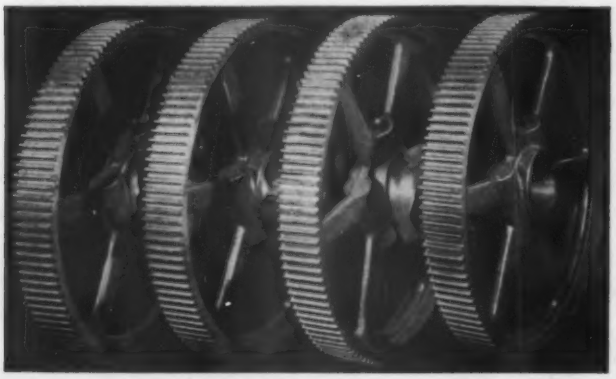

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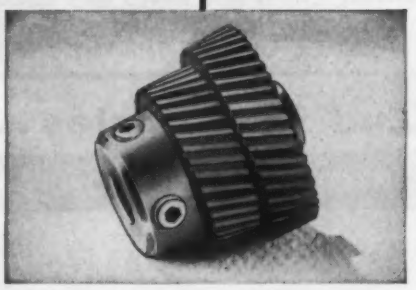
See How



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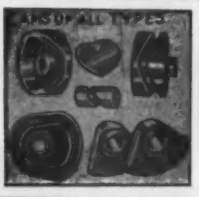

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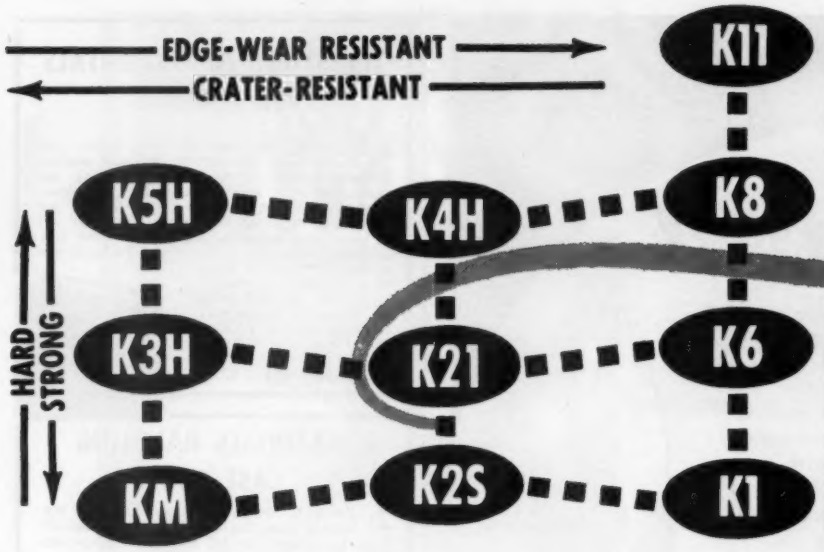

Use Grade K21—the NEW Kennametal* General Purpose Steel-Cutting Grade

The Grade Selection Guide (above), which groups Kennametal grades according to strength, hardness, and wear characteristics, pinpoints the *new* K21 as a medium grade for general purpose steel-cutting applications. It is stronger than K5H, K4H, and K8. It has greater edge-wear resistance than K3H and KM, and more crater resistance than K11, K8, K6, and K1. Thus, K21 is for moderate, as well as heavy roughing of scaly, abrasive steel castings and forgings, and for interrupted cutting and milling operations requiring high resistance to edge wear, to cratering, and to shock. K21 shows exceptional performance on modern high-speed machines, and, due to its range, does an excellent job on older, slower-speed machines as well.

Because of this performance, K21 is rapidly becoming recognized as the leader of all general purpose steel-cutting grades. It's a premium grade at no extra cost. Ask your Kennametal Representative for performance facts; and for a copy of the Grade Selection Guide shown above . . . it's the most simple system of selecting the right grade for every job that has ever been developed.

Kennametal Engineers are ready to help you

Every Kennametal Representative is a tool engineer. He is trained to help you analyze tool wear—apply the right tool and grade to the job—establish proper lathe speeds and feeds—train machinists to get increased production at the lowest possible cost with Kennametal Tools. In addition to his own broad experience, he has available to him the backgrounds of 150 other Kennametal Tool Engineers. His office is listed in the classified telephone directory in principal cities. Call him, or write KENNAMETAL INC., Latrobe, Pa.

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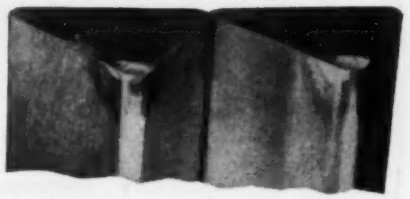
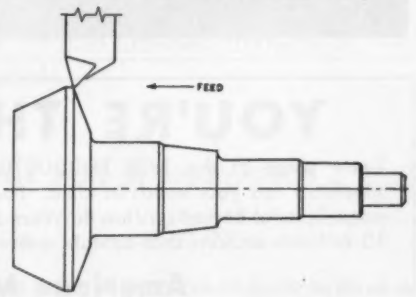


Grade K21, on the left, shows less wear than competitive grade (at right) after turning 100 pieces.

Four competitive grades of cemented carbides were used in a recent comparative test machining SAE 4620 rear axle drive pinion forgings. (See drawing below.) Each grade was removed for examination of the cutting edge after turning 100 pieces. The competitive inserts showed sufficient wear to require indexing to a new cutting edge, while the Grade K21 insert (at left above) turned 200 additional pieces before it was indexed. This 3 to 1 ratio in tool life typifies the results being obtained on many types of machining jobs with this *new* Kennametal grade, including forgings, sandy castings, centrifugal castings, plate, weldments and highly abrasive silicon steels.



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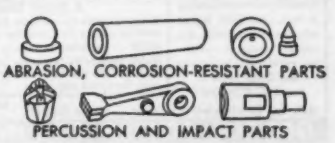
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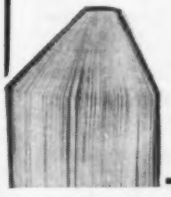

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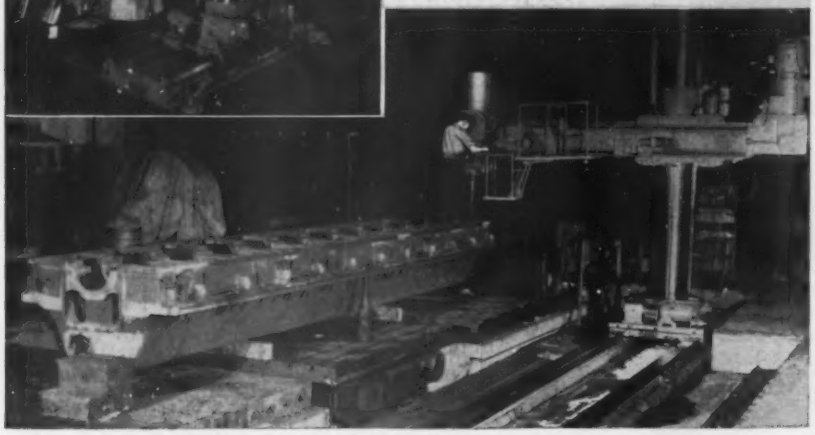

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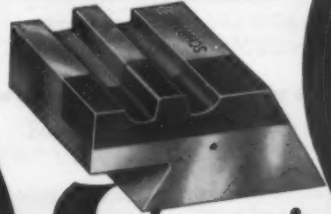

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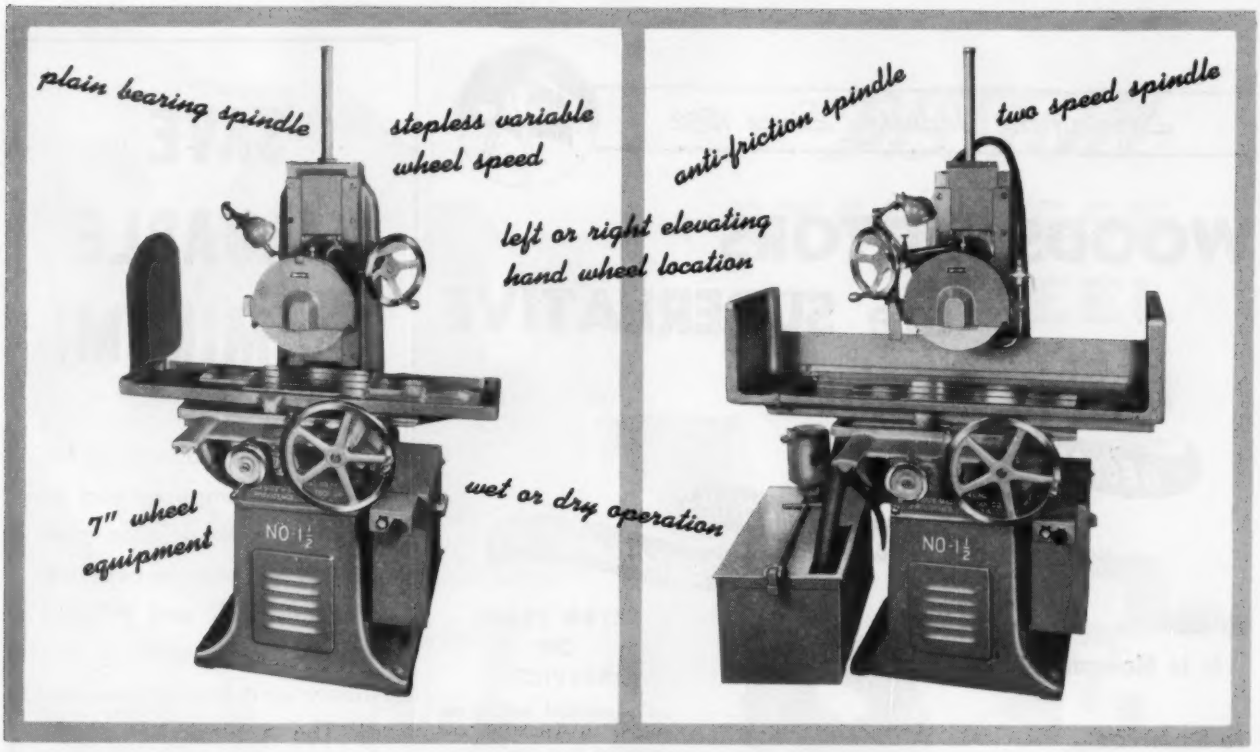

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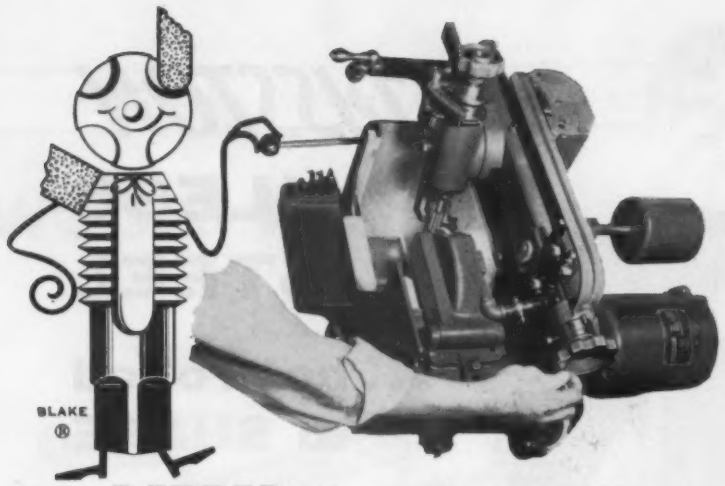

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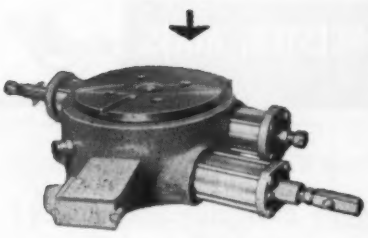

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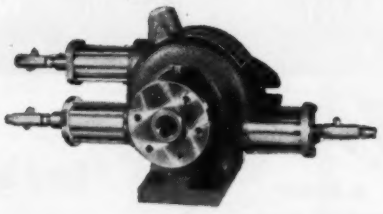

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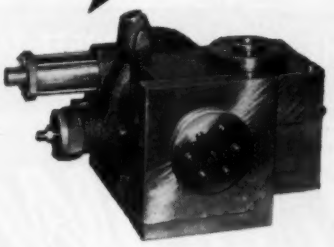

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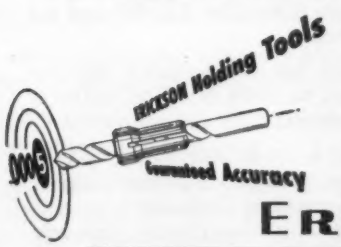

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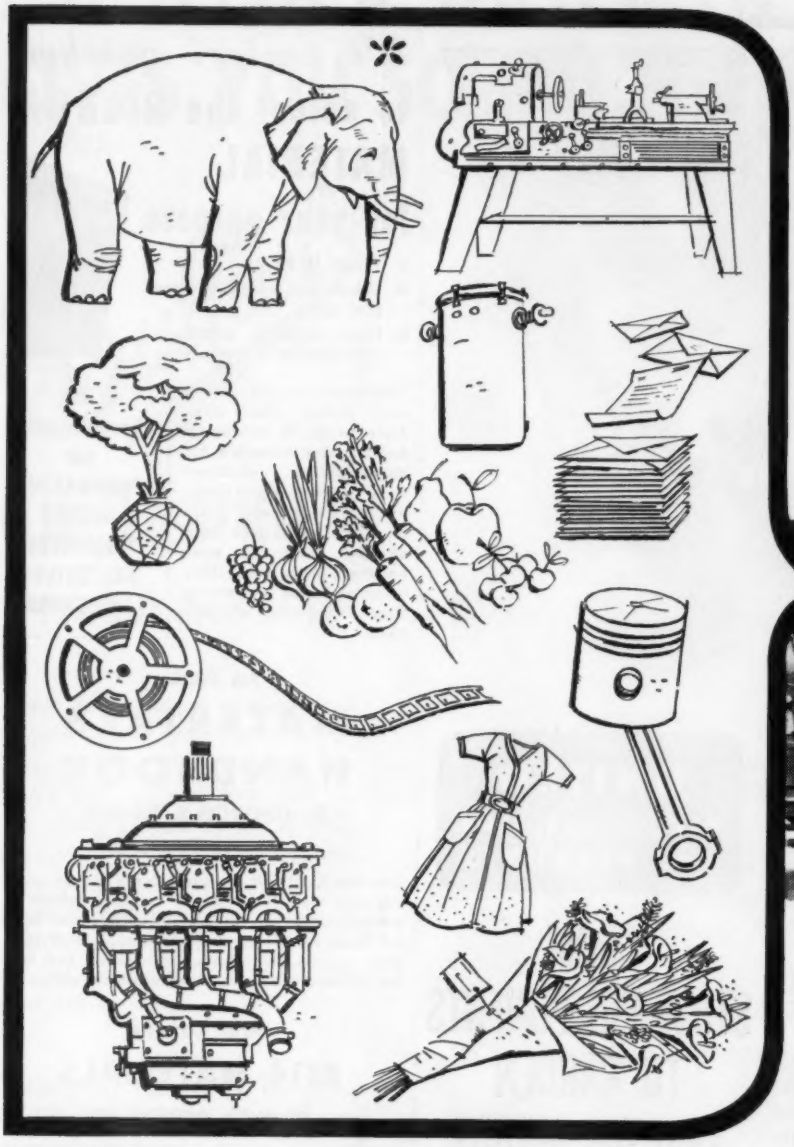

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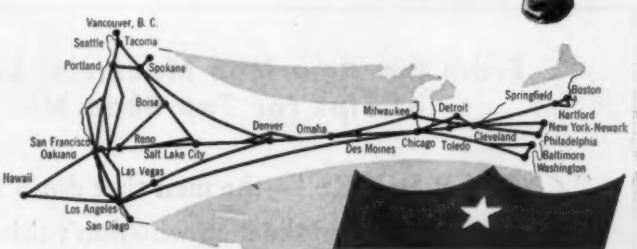

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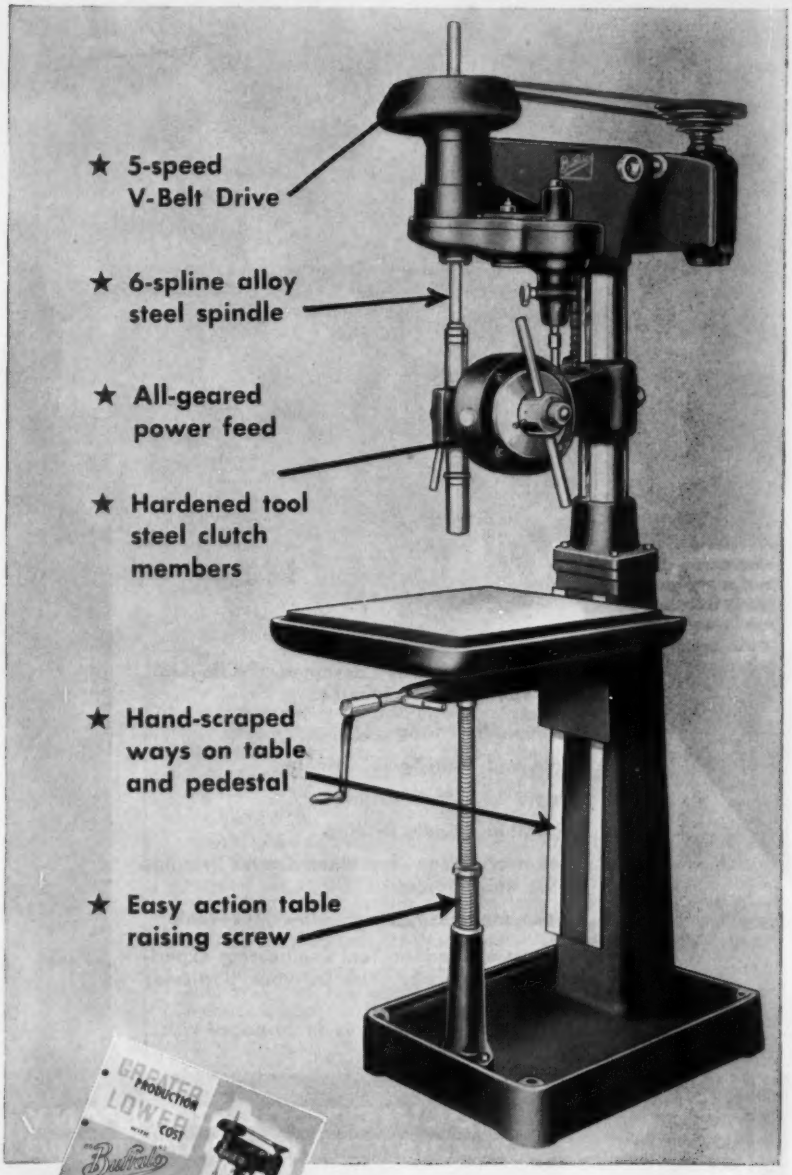
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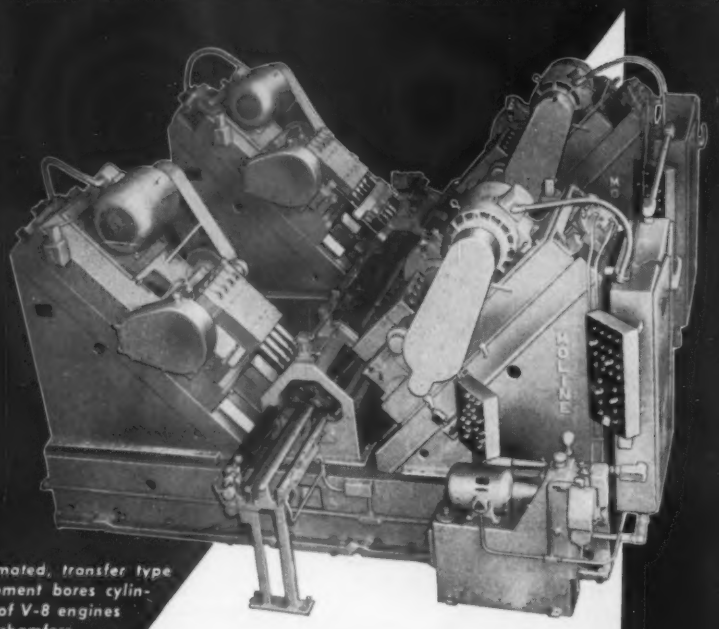

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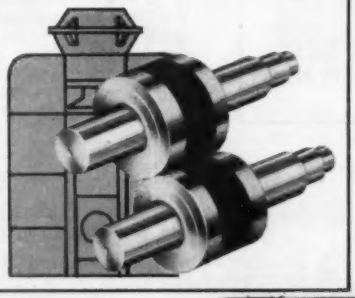

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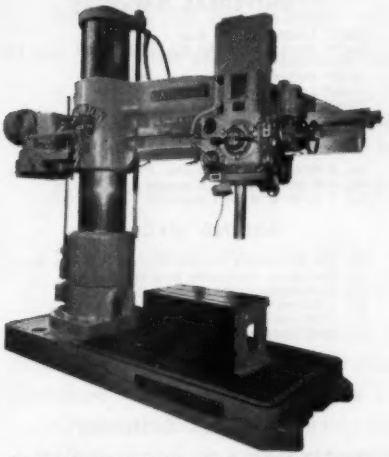

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No. 3B Edlund—6 spdl.—30" sw.
No. K60H Fox Multiple

GEAR MACHINES

No. 4—72" Pfauter Hobber
11" Gleason Gear Generator
No. 36BM Gould & Eberhardt
No. 615A Fellows Gear Shaper
No. 612A Fellows Gear Shaper
No. 6S Fellows, Cone Drive
No. 12HS Gould & Eberhardt

GRINDERS

No. 4H—4"x12" Landis Plain Cyl.
5"x30" Norton Cam-O-Matic
5"x42" Norton Type C Pl.
6"x18" Norton Type C Plain
8"x15" Elgin EB-5C
10"x18" Norton Type C Pl. Cyl.
10"x30" Cinn. EA
10"x36" Norton Type C
10"x36" Norton Type C Cam Gdr.
14"x48" Landis Type C Plain
14"x48" Landis Univ.
16"x36" Norton Type C Pl.
16"-26"x72" Norton Pl.
16"-46"x48" Landis Type D Pl.
18"x36" Cinn. ER Univ.
18"x120" Norton Type A Plain
20"x96" Norton
20"-32"x144" Norton Gap
20"x192" Norton Type A Plain
24"x264" Norton Type A Plain
No. TG615 J. & L. Thread Grinder
No. 81 Heald Int. Centerless
No. 74 Heald Int. Centerless
No. 72-A Heald Univ. Int.
No. 72A5 Heald Int. (1942)
No. 72A5 Heald Bridge Int.
No. 5 Bryant Internal
No. 5A Bryant Hole & Face
No. 5B Bryant Internal
No. 16-16 Bryant Internal
No. 16-28 Bryant Internal
No. 16A16 Bryant
No. 16A-28 Bryant Internal
No. 16F-28 Bryant Internal
No. 16-36 Bryant Internal
No. 24-26 Bryant Internal
No. 24-36 Bryant Internal
No. 24L-36 Bryant Internal
A3-16 Arter Surf. (1942)
No. B24—25" chuck Arter Surf.
No. 214 Besly Dbl. End Disc
#8 Badger Hanchett Double End Discs.
Hill-Clarke Cyl. Norton Type M.D.
10"x36" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x50" centers
14"x72" centers
16"x72" centers
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LATHES

12"x21" Fay Automatic
16"x21" Fay Automatic (1944)
16"x33" R-14 Seneca Falls
16 ML 16 LeBlonde Semi-Auto.
18"x51" cc American Grd. Hd.
27"x84" cc American Geared Hd.
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No. 5W Acme Universal
No. 6 Warner & Swasey, bar fd.
No. 7A Jones & Lamson
No. 1A Warner & Swasey
No. 2A Warner & Swasey
No. 3AL Gisholt Cross Slide
No. 3H-10 Libby International
No. 3A Warner & Swasey Turret Lathe
No. 4A Warner & Swasey M.D.
No. 4A Warner & Swasey (1944)

MILLING MACHINES

No. 2HL K. & T. Milwaukee Plain
No. 4 Cincinnati Dial Type Plain
No. 08 Cincinnati Vertical
118 Van Norman Hyd. Mfg. (1942)
Model A Briggs Mfg.
54"x30"x16" Ingersoll Slab
10"x60" Pratt & Whitney Thread
12"x102" HT Lees-Bradner Thread
Model CT Lees Bradner Thread Mill (1942)
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No. 1-18 Cinn. Mfg.

PLANERS

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MISCELLANEOUS

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No. 2L-6 La Pointe Horiz. Hyd. Broach
8 Spdl.—6" Goss & DeLeeuw Chucker
No. 56 Sundstrand Double End Cent. Mach.
Foote-Burt 1 Spdl. Boring Mach. (1941)
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No. 124—53" Grinder Horizontal, m.d.

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6x18" Cincinnati Model EA, m.d.
6x18" Cincinnati Model ER Plain Hydraulic, m.d., Filmatic Spindle
6x18" Landis Type C Hydraulic, m.d., late
10x18" Cincinnati Model EA, m.d.
10x18" Norton Type C, m.d., latest
10x36" Norton Type C, m.d.
10x36" Cincinnati Hydraulic, m.d.
10x72" Landis, m.d.
10x72" Norton, motorized
12x36" Landis Plain Self-Contained, m.d.
12x90" Landis Plain Self-Contained, m.d.
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14x52" Norton, motorized
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14x72" Cincinnati Model ER, m.d., latest type, Filmatic Spindle
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14x48" Landis Universal

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No. 16—22" Bryant, m.d., latest
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No. 18-A-28 Bryant, m.d.
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No. 24-LW-36 Bryant, m.d., late
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No. 72A5 Heald Plain, m.d.
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No. 75A Heald, m.d., latest
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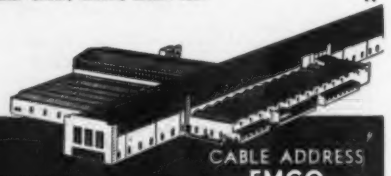

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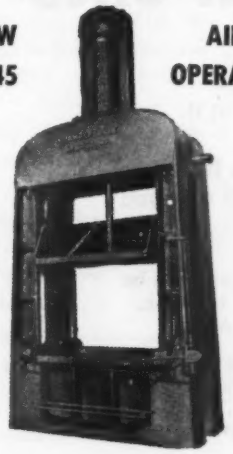

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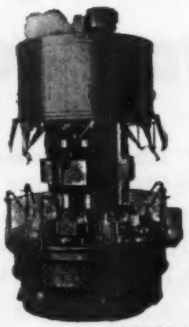

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Reach for the phone. It's dead. Well, you might have known.
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And quick.
You've never needed help like you need it now.
But the same goes for everyone else in town.
Thank God Jones made all those people go to the first-aid classes.
Looks like they'll be the only help you'll get for hours.
Thank God they've got plenty of dressings, splints and stuff.
Remember when you got sore at Jones?
("All this stupid first-aid malarkey," you called it.)
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- ☐ **Check contents** and locations of first-aid kits.
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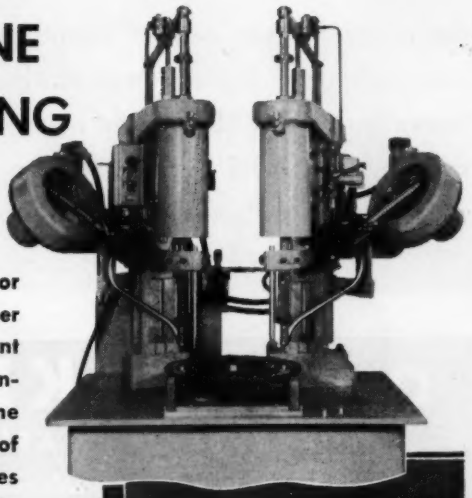

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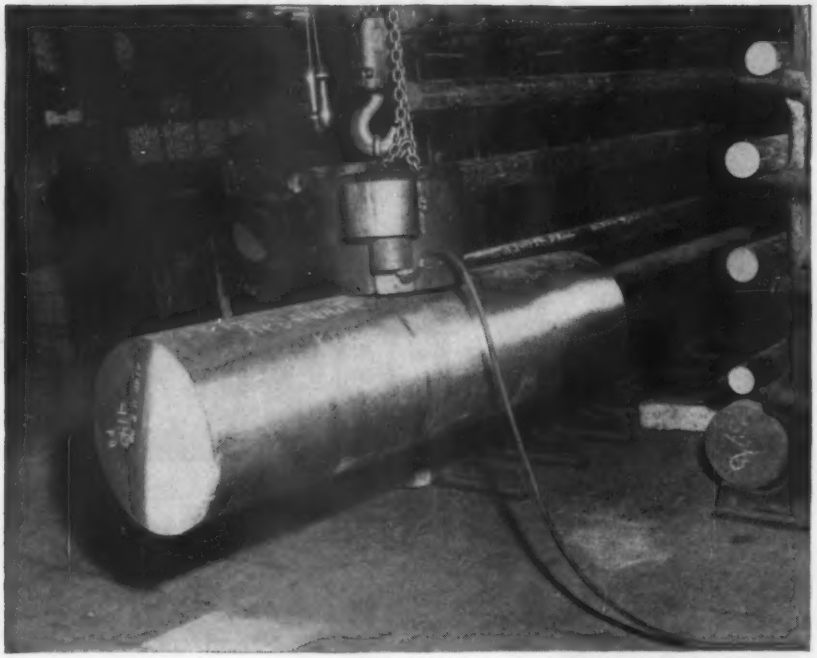

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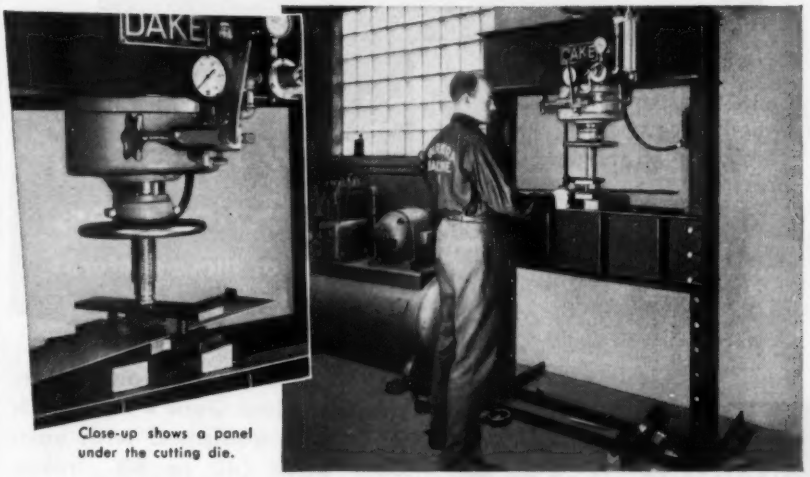
BUILD a good reputation in your community. Morale and efficiency usually are high in the plant that is known as "a good place to work."

Used his head, a $100 die, and a DAKE Hydraulic Press

to reduce cost of cutting job from 88¢ to 9¢ a panel



Close-up shows a panel under the cutting die.

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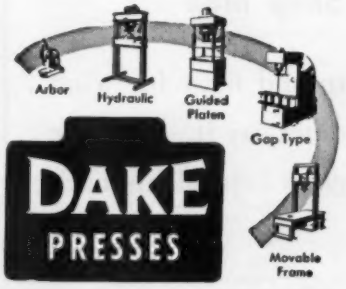

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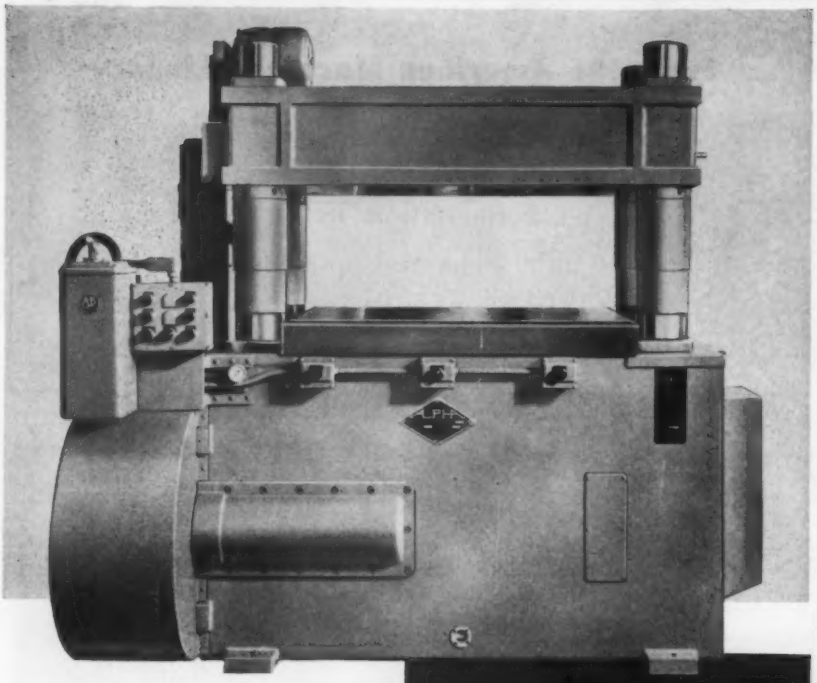

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From the *American Machinist* Library of *Tips for Top Shop Men*

BE MAN enough to stand up and fight for what you say and believe—or don't say it. If you're afraid of the boss, making remarks behind his back won't give you confidence.

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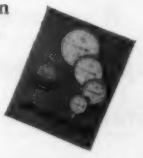

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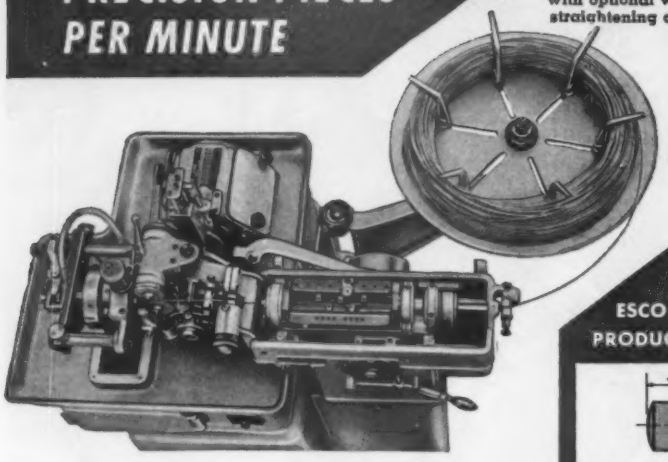

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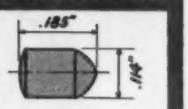
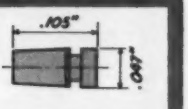
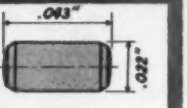


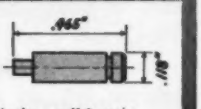
100/min.—brass



63/min.—nickel-silver



50/min.—nickel



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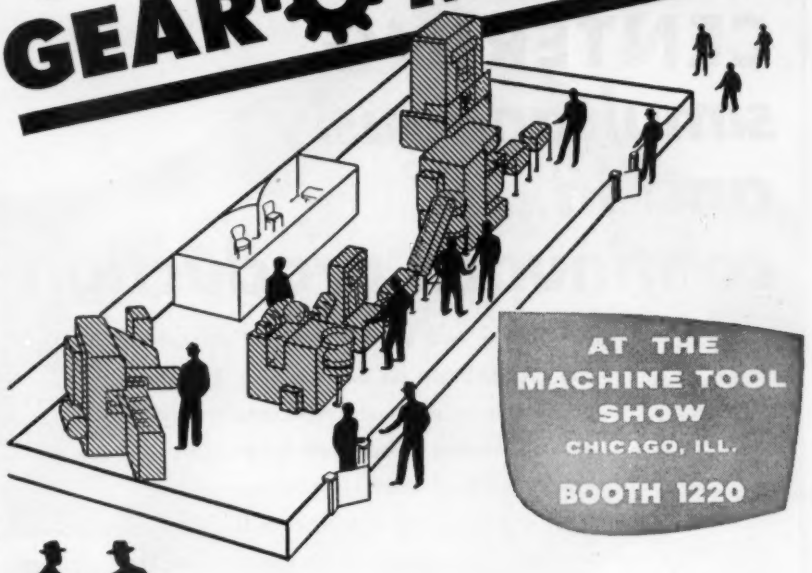
See GEAR-O-MATION*



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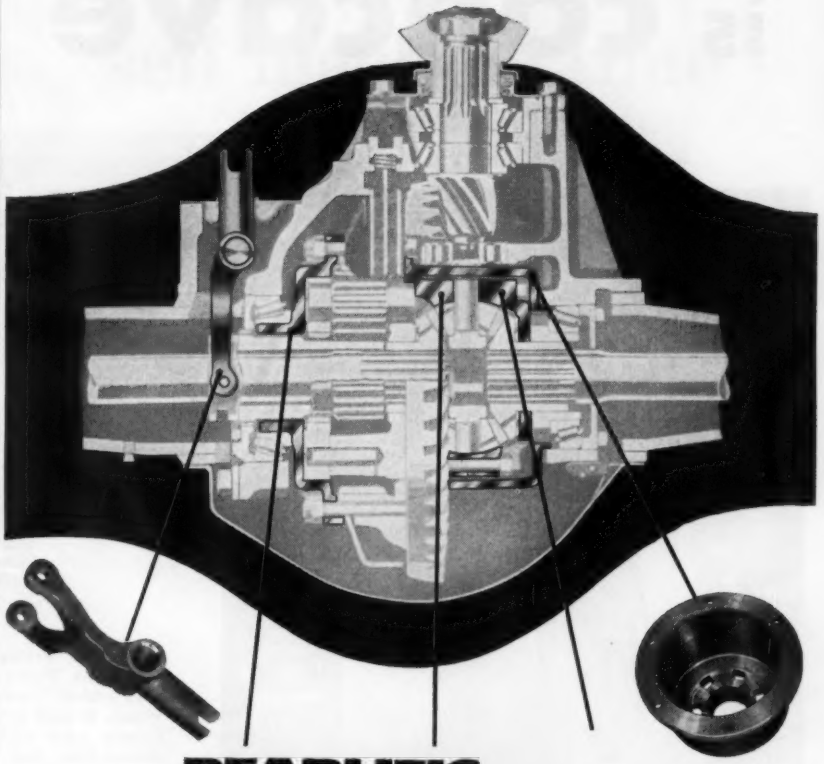

PEARLITIC MALLEABLE CASTINGS

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Look your product over critically. Pearlitic malleable castings—from National—can replace costlier fabrication methods . . . can offer opportunities of reduction in weight, machining and assembly time. AA-1197

Photos: Courtesy Eaton Manufacturing Company

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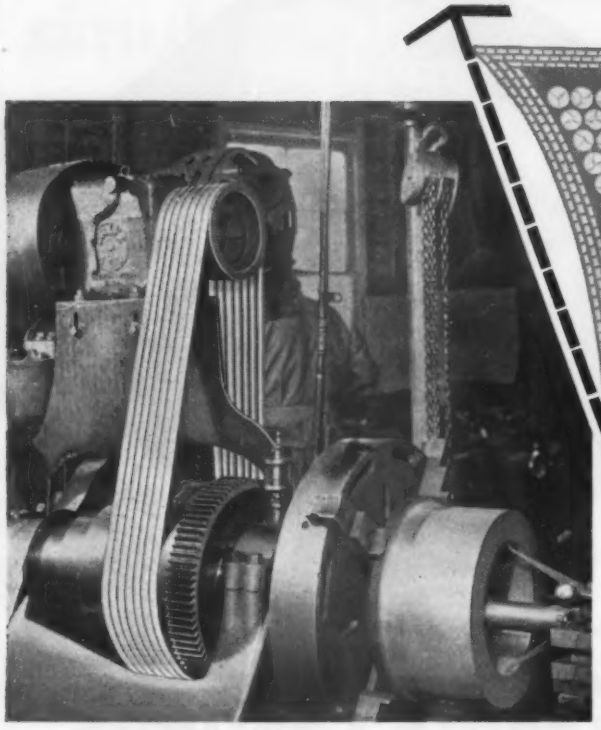

By converting the drive on this lathe to Gates Vulco Ropes, drive slippage was ended. Under heavy load, the Gates Vulco Ropes grip pulley grooves more firmly and pull harder. Management states that now that the lathe can take heavier cuts, they are getting twice as much production as before.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides.*

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear.* Naturally, *even wear* means *longer wear.* And longer wear cuts belt replacement costs...reduces down time...contributes to profits.

Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

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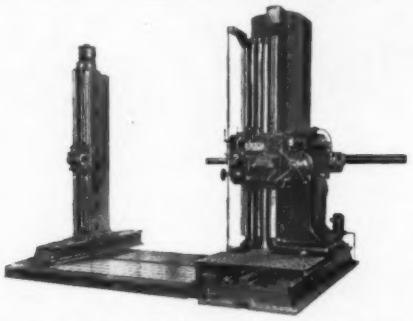
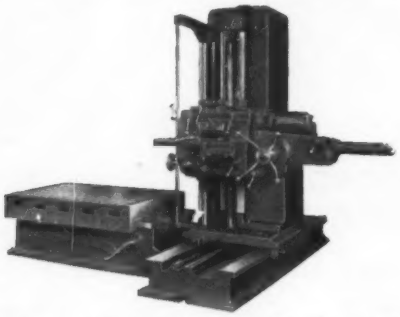
TPA 46-A

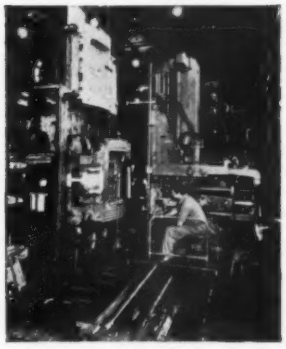
GATES VULCO ROPE DRIVES



Floor type with bed plate and boring bar support. Used in shops where workpieces are large, weighing as much as 20 tons. Stationary or adjustable tables can be attached to the bed plate.



Floor type with large table, adjustable either by hand or power. The Gilbert machine can be rail mounted to increase operating range and flexibility.



Large Gilbert floor type horizontal boring mill equipped with a duplicating attachment for spindle. 3¾" spindle, 96" vertical travel of spindle head, 120" horizontal travel of column on runway.

Specification summary	floor type
Spindle diameter	*3½" or 3¾"*
Continuous feed to spindle	*30"*
Vertical travel of spindle head	*36"-96"*
Horizontal travel of column	*48"-"168"*
Drive motor, hp	*7½ or 10HP*

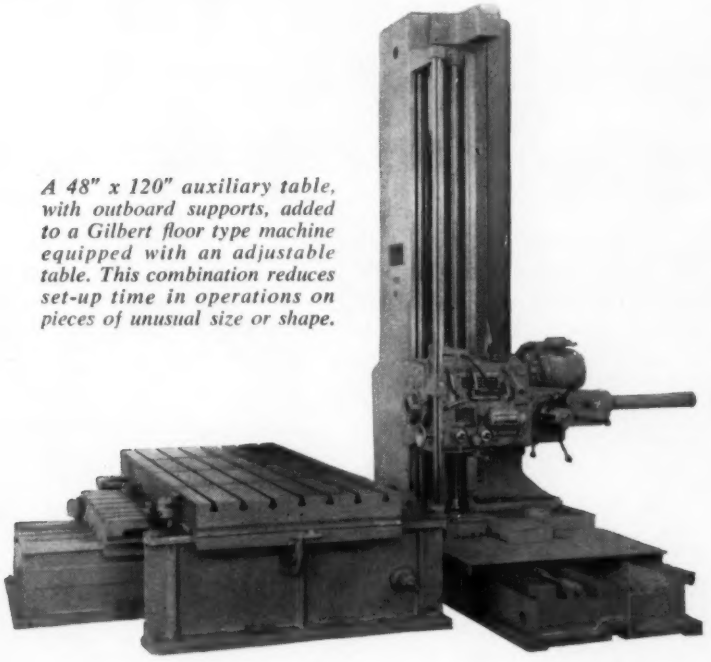
sell machine time for less per hour

You can sell your machine time for much less per hour if your machine is a Cincinnati Gilbert boring mill.

Take the floor type Gilbert, for example. Combine the basic machine with one of Gilbert's many workholding units, and you can do as many operations as you can do on equipment costing many times more. With the revolving-column Gilbert, you can even mill cavities with straight sides or reverse curves without resetting work. If you wish, the Gilbert mill can be adapted to workholding equipment or runways already in your shop.

Ask for a proposal; you'll see that it pays to replace with a Gilbert. New literature will be sent at your request.

A 48" x 120" auxiliary table, with outboard supports, added to a Gilbert floor type machine equipped with an adjustable table. This combination reduces set-up time in operations on pieces of unusual size or shape.

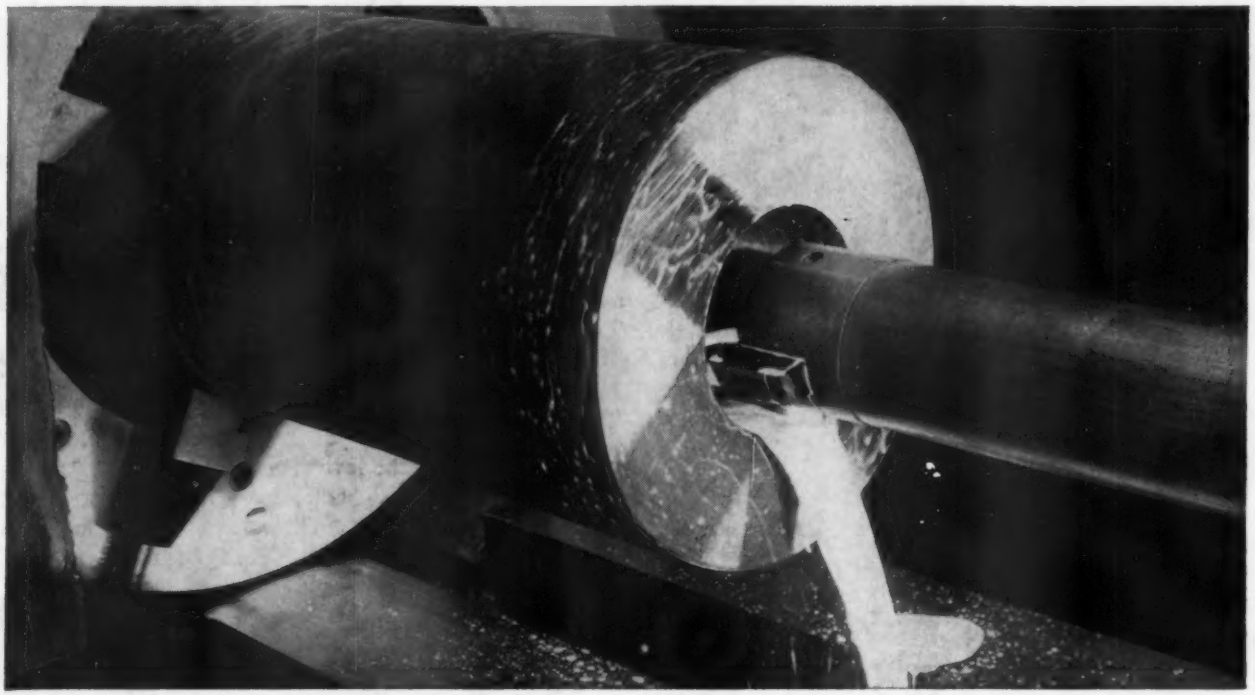


GILBERT

RADIALS • BORING MILLS • ACCESSORIES

THE CINCINNATI GILBERT MACHINE TOOL CO., 3366 BEEKMAN ST. • CINCINNATI 23, OHIO

START WITH FINISH BORING!



TIMKEN® seamless steel tubing saves steel, machining time!

FINISH boring is your first production step when you use Timken® seamless steel tubing instead of bar stock for your hollow parts jobs. You don't have to bore out the center hole. With Timken seamless tubing, it's "built-in"! So screw machine stations are available for other jobs. You add machining capacity without adding machines.

Because the center hole is already there, you also save steel with Timken seamless tubing. There's far less metal to machine away, giving you more parts per ton of steel.

To save you even *more* steel, the Timken Company's engineers will study your problem and recommend the most economical tube size for your hollow parts job—a size guaranteed to clean up to your dimensions.

Timken seamless tubing results in a better quality product, too. The piercing operation by which Timken tubing is made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat, due to the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING